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CONNECTICUT RIVER BASIN  
EAST HAMPTON, CONNECTICUT  
**BEVINS POND DAM**  
CT 00360

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS. 02154

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AUGUST, 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earth embankment with a total length of approximately 500 feet, including a 21.6 foot wide masonry rectangular weir spillway near the center of the dam. Based upon the visual inspection at the site and past performance, the project is judged to be in fair condition. The dam is classified as a high hazard, small size dam. The test flood range to be considered is from 1/2 to full PMF.		

CONNECTICUT RIVER BASIN  
EAST HAMPTON, CONNECTICUT  
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DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS. 02154

AUGUST, 1980

**BRIEF ASSESSMENT**

**PHASE I INSPECTION REPORT**

**NATIONAL PROGRAM OF INSPECTION OF DAMS**

Name of Dam:	<u>BEVINS POND DAM</u>
Inventory Number:	<u>CT 00360</u>
State Located:	<u>CONNECTICUT</u>
County Located:	<u>MIDDLESEX</u>
Town Located:	<u>EAST HAMPTON</u>
Stream:	<u>POCOTOPAUG CREEK</u>
Owner:	<u>BEVINS BROS. MFG. CO.</u>
Date of Inspection:	<u>JULY 7, 1980</u>
Inspection Team:	<u>PETER HEYNEN, P.E.</u>
	<u>HECTOR MORENO, P.E.</u>
	<u>TIMOTHY KAVANAUGH</u>
	<u>ROBERT JAHN</u>

The dam, completed in 1898, is an earth embankment with a total length of approximately 500 feet, including a 21.6 foot wide masonry rectangular weir spillway near the center of the dam. Above the spillway crest, permanent stop planks backfilled with gravel raise the pond level 1.6 feet. The top of the embankment is approximately 12 feet wide and 4.6 feet above the top of the stop planks. The dam is 26.7 feet in height above the spillway channel, which passes under the Bevins factory. With the pond level to the top of the dam, the dam impounds approximately 240 acre-feet of water. At the right abutment of the dam is an abandoned grass emergency spillway which is blocked by an earth berm. A 24 inch low-level outlet passes through the embankment to outlet at the toe of the spillway wall and is operated from the gatehouse adjacent to the spillway. From the left gatehouse a 36 inch penstock passes through the embankment to the factory building as a supply line for a water wheel. This water wheel is no longer utilized but some water is drawn for manufacturing purposes by a small electric pump. A 3' x 4' concrete intake structure, located near the left abutment of the dam, is utilized by a diesel engine powered pump to supply water for fire protection for the factory.

Based upon the visual inspection at the site and past performance, the project is judged to be in fair condition. However, there are items which require maintenance and/or evaluation, such as irregularities and protection of the upstream and downstream embankment slopes.

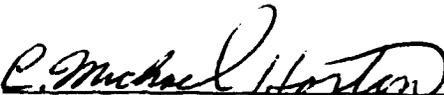
In accordance with the Army Corps of Engineer's Guidelines, Bevins Pond Dam is classified as a high hazard, small size dam. The test flood range to be considered is from 1/2 to full Probable Maximum Flood (PMF). The test flood for Bevins Pond Dam is equivalent to full PMF. Peak inflow to the reservoir at the full PMF is 3800 cubic feet per second (cfs); peak outflow is 3700 cfs with the dam overtopped by 2.5 feet. The spillway capacity with the reservoir level to the top of the dam is 250 cfs, which is equivalent to 6.8% of the routed test flood outflow.

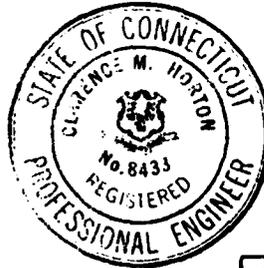
It is recommended that the owner retain the services of a registered professional engineer to analyze in more detail the adequacy of the project discharge capacity. Other items of importance are repair of embankments, deteriorated masonry and evaluation of existing outlet facilities. Recommendations made by the engineer should be implemented by the owner.

The above recommendations and further remedial measures presented in Section 7 should be instituted within one year of the owner's receipt of this report.

  
 Peter M. Heynen, P.E.  
 Project Manager - Geotechnical  
 Cahn Engineers, Inc.



  
 C. Michael Horton P.E.  
 Chief Engineer  
 Cahn Engineers, Inc.



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This Phase I Inspection Report on Bevins Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and are hereby submitted for approval.

ARAMAST MAHTESIAN, Member  
Geotechnical Engineering Branch  
Engineering Division

CARNEY M. TERZIAN, Member  
Design Branch  
Engineering Division

RICHARD DIBUONO, Chairman  
Water Control Branch  
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR  
Chief, Engineering Division

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam would necessarily represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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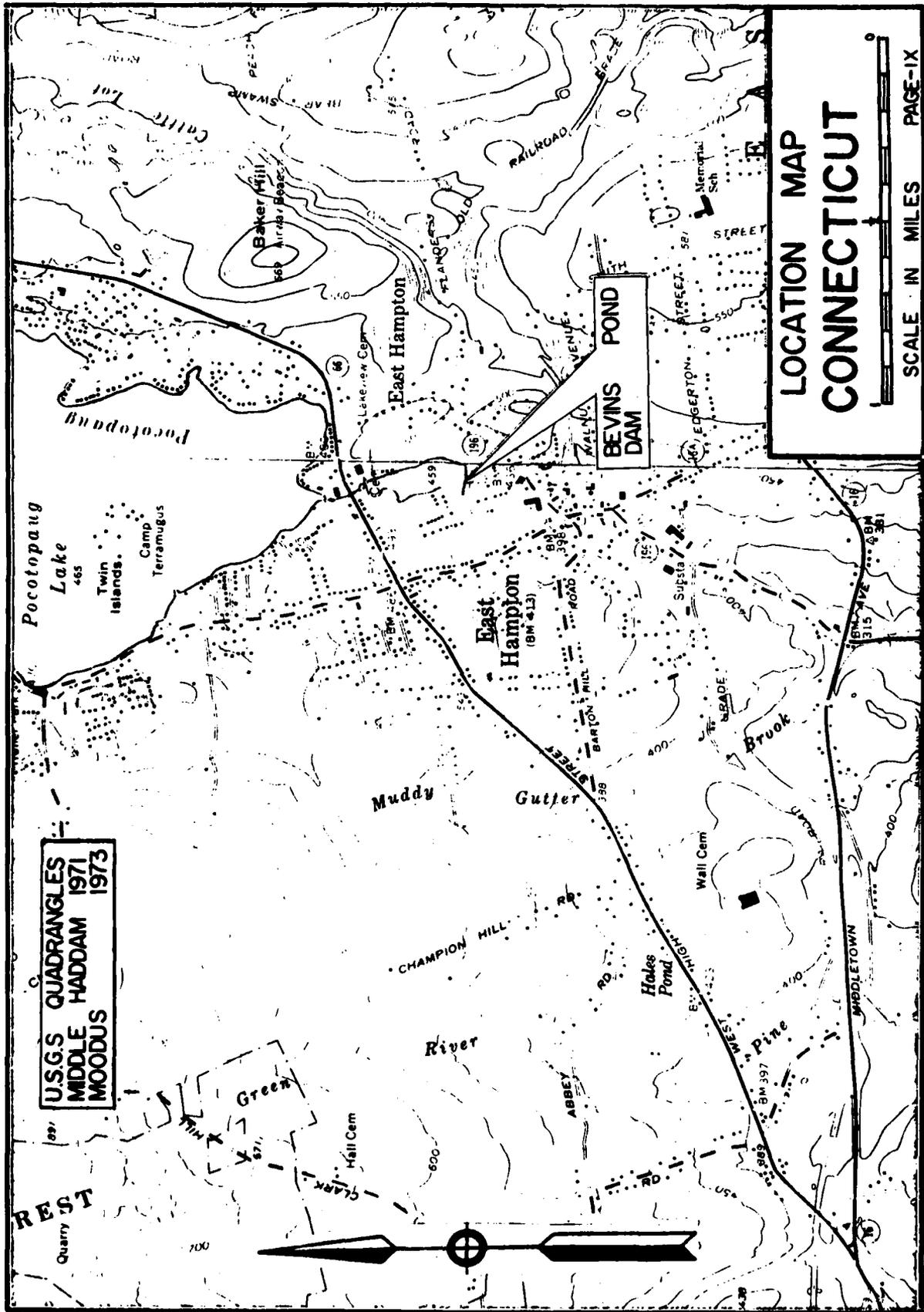
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OVERVIEW PHOTO  
(February, 1980)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	Bevins Pond Dam	East Hampton	DATE <u>JULY '80</u>
		Pocotopaug Creek	CONNECTICUT	CE # <u>27 785KB</u>
CAMN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER				PAGE <u>viii</u>



**LOCATION MAP  
CONNECTICUT**

SCALE IN MILES PAGE-IX

U.S.G.S. QUADRANGLES  
MIDDLE HADDAM 1971  
MOODUS 1973

REST  
Quarry



## PHASE I INSPECTION REPORT

### BEVINS POND DAM

#### SECTION I - PROJECT INFORMATION

##### 1.1 GENERAL

a. Authority - Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of April 14, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0052 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dam.
3. To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.
2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.
3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.
4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

## 1.2 DESCRIPTION OF PROJECT

a. Location - The dam is located on Pocotopaug Creek in a densely populated area of the Town of East Hampton, County of Middlesex, State of Connecticut. The dam is shown on the Middle Haddam USGS Quadrangle Map having coordinates latitude N 41° 34.8 and longitude W 72° 30.0'.

b. Description of Dam and Appurtenances - As shown on Sheet B-1, the approximately 26.7 foot tall dam is an earth embankment structure. The dam is approximately 500 feet long, including a 21.6 foot long masonry spillway located approximately at the center of the earth embankment. There is a low-level outlet through the bottom of the spillway wall and a penstock through the embankment to the factory building. At the left abutment of the dam a diesel engine powered pump is used to draw pond water for fire protection at the factory. At the right end of the dam is a 14 foot long abandoned grass emergency spillway which is blocked by an earth berm.

The spillway, having a crest elevation of 457.4 is a 21.6 foot long masonry weir of rectangular cross-section with 1.6 foot high permanent stop planks. A shallow, gravelly approach channel and a nearly vertical downstream face are other spillway features. The spillway discharges onto a broad concrete splash apron which funnels into a 4'x 13' rectangular concrete and masonry channel under the Bevins factory.

The earth embankment section has a maximum height of approximately 26.7 feet and a top elevation 4.6 feet above the top of the stop planks. It has a top width of approximately 12 feet near the spillway and widens to approximately 35 feet at the abutments.

Hand wheel pedestal lift type gate valves control the flows from both the 24 inch low-level outlet and the 36 inch penstock. The penstock hand wheel pedestal lift, which is operable, is left in the full open position and flow is controlled by a hand valve at the water wheel. The diesel pump draws water through the 3'x4' concrete intake structure only when testing the equipment and fighting fires.

c. Size Classification - SMALL - The dam impounds 240 acre-feet of water with the lake level to the top of the dam, which at elevation 463.3 is 26.7 feet above the spillway channel. According to the U.S. Army Corps of Engineers' Recommended Guidelines, a dam with this height and maximum storage is classified as small in size.

d. Hazard Classification - HIGH - If the dam were breached, there is potential for the loss of more than a few lives and extensive property damage to the Bevins Manufacturing Company, located at the toe of the dam and to sections of the densely populated area of downtown East Hampton located 1000 feet downstream.

e. Ownership - Bevins Manufacturing Company  
Mr. Stanley Bevin  
Bevin Rd.  
East Hampton, CT  
Tel: (203)429-3955 (Home)  
(203)267-4431 (Office)

The dam was built by the Bevins Manufacturing Company in 1898.

f. Operator - Mr. Stanley Bevin  
174 Cedar Swamp Rd.  
Mansfield, CT.  
Tel: (203) 429-3955

g. Purpose - Fire protection; primary  
Manufacturing; secondary

h. Design and Construction History - There is no documented information on the design or construction of the dam; however, the following information was obtained during an interview with the owner of the dam. The dam was constructed in 1898 for fire protection and to supply water for manufacturing at the Bevins Company. The left abutment was repaired after it was overtopped in 1938. As explained by an employee of the Bevins Co.; when the dam overtopped, or was about to overtop, in 1938, a temporary emergency spillway was constructed at the right abutment to prevent further overtopping and possible failure of the dam. This spillway still exists.

i. Normal Operational Procedures - The following operational procedures were described during an interview with the owner. The pond water level is maintained to the elevation at the top of the stop logs (459) and observed daily. The low-level outlet handwheel pedestal lift remains closed during normal pool. The penstock handwheel pedestal lift remains open and flow is regulated by a valve located in the factory at the waterwheel. When heavy rain is forecast, Pocotopaug Lake, which is located just upstream from Bevins Pond and is owned and operated by the Bevins Company, is lowered up to 18 inches to increase its storage capability and prevent overtopping of the Bevins Pond Dam. Rainfall is monitored and data documented. Vegetation on the dam is cut when needed.

Operation procedures were explained by the owner/operator of the dam but no documented data was available.

### 1.3 PERTINENT DATA

a. Drainage Area - The drainage area is 4.63 square miles of moderately developed rolling terrain.

b. Discharge at Damsite - Discharge is over the spillway, through the low-level outlet and through the penstock.

- |   |   |
|---|---|
| 1. Outlet Works   | 80 cfs - 24" iron pipe<br>low-level outlet<br>invert el. 436.9+ |
|   | 180 cfs - 36" iron pipe<br>penstock invert el. unknown          |
| 2. Maximum known flood at<br>damsite:                   | Not known   |
| 3. Ungated spillway capacity<br>@ top of dam el. 461.3: | 180 cfs   |
| 4. Ungated spillway capacity<br>@ test flood el. 463.8: | 530 cfs   |
| 5. Gated spillway capacity<br>@ normal pool:            | N/A   |
| 6. Gated spillway capacity<br>@ test flood:             | N/A   |
| 7. Total spillway capacity<br>@ test flood el. 463.8:   | 530 cfs   |
| 8. Total project discharge<br>@ top of dam el. 461.3:   | 440 cfs   |
| 9. Total project discharge<br>@ test flood el. 463.8:   | 3700 cfs  |

c. Elevations - Elevations are approximate National Geodetic Vertical Datum (NGVD) based on an assumed elevation of 459.0 at top of stop planks.

- |   |           |
|---|-----------|
| 1. Streambed at toe of dam:               | 436.9     |
| 2. Bottom of cutoff:                      | Not Known |
| 3. Maximum tailwater:                     | N/A       |
| 4. Normal pool:                           | 459+      |
| 5. Full flood control pool:               | N/A       |
| 6. Spillway crest (ungated):              | N/A       |
| 7. Design surcharge<br>(original design): | Not Known |

8. Top of dam:	461.3+ to 463.3+
9. Test flood surcharge:	463.8
d. <u>Reservoir Length</u>	
1. Normal pool:	1440 ft.
2. Flood control pool:	N/A
3. Spillway crest pool:	N/A
4. Top of dam pool:	1700 ft.
5. Test flood pool:	1800 ft.
e. <u>Reservoir Storage</u>	
1. Normal pool:	145 acre-ft.
2. Flood control pool:	N/A
3. Spillway crest pool:	N/A
4. Top of dam pool:	240 acre-ft.
5. Test flood pool:	245 acre-ft.
f. <u>Reservoir Surface</u>	
1. Normal pool:	12.2+ acres
2. Flood control pool:	N/A
3. Spillway crest pool:	N/A
4. Top of dam pool:	22.0+ acres
5. Test flood pool:	23.0+ acres
g. <u>Dam</u>	
1. Type:	Earth Embankment
2. Length:	+500.0 Total 21.6 (spillway) +478.4 (embankment)
3. Height:	26.7 ft.
4. Top width:	12 ft. at spillway increasing to 35+ at abutments

5. Side slopes: 1.4 horizontal to 1 vertical (downstream)  
1.7 horizontal to 1 vertical (upstream)
6. Zoning: N/A
7. Impervious core: N/A
8. Cutoff: N/A
9. Grout curtain: N/A
10. Other: N/A
- h. Diversion and Regulating Tunnel - N/A
- i. Spillway
1. Type: Masonry rectangular weir
2. Length of weir: 21.6 ft.
3. Crest elevation: +457.4  
Top of stop planks: 459.0 (assumed datum)
4. Gates: 24" Low-level outlet through spillway wall  
36" Penstock through embankment to factory
5. Upstream channel: Shallow gravel bottom
6. Downstream channel: Concrete and masonry
7. General: Masonry spillway wall is near vertical. Spillway channel routes under factory. Permanent stop planks, 1.6 foot high, raise the normal pool elevation to 459.0 feet.
- j. Regulating Outlets
- Low-level outlet
1. Invert: 93.7
2. Size: 24 in. dia.
3. Description: Cast iron pipe

4. Control mechanism:

Hand wheel pedestal  
lift

Penstock

1. Invert:

Not known

2. Size:

36 in. dia.

3. Description:

Cast iron pipe

4. Control mechanism:

Hand wheel pedestal lift

5. Other:

fire pump intake  
3.5'x 4.5' concrete intake  
with trash rack  
Invert 91.2

## SECTION 2: ENGINEERING DATA

### 2.1 DESIGN DATA

The available data consists of a brief report, submitted July 11, 1963 by Buck and Buck Engineers of Hartford, Connecticut, entitled; "Report on the Inspection and Review of Existing Dams on Pocotopaug Creek". (See Appendix B).

There were no engineering values, assumptions, test results or calculations available concerning the construction of the dam.

### 2.2 CONSTRUCTION DATA

Approximately eight construction photographs are on file at the Bevins factory.

### 2.3 OPERATIONS DATA

Lake level readings are taken daily. According to the owner the dam was overtopped in 1938. The owner performs periodic informal inspections of the dam. No operations records are known to exist.

### 2.4 EVALUATION OF DATA

a. Availability - Existing data was provided by the State of Connecticut Department of Environmental Protection. The owner made the project available for visual inspection.

b. Adequacy - There was no detailed engineering data available; therefore, the final assessment of this project must be based on visual inspection, performance history, hydraulic computations of spillway capacity, and hydrologic judgements.

c. Validity - A comparison of record data and visual observations reveals no significant discrepancies in the record data.

## SECTION 3: VISUAL INSPECTION

### 3.1 FINDINGS

a. General - The general condition of the project is fair. The inspection revealed several areas requiring maintenance and monitoring. At the time of the inspection the pond level was at elevation 459.0 i.e., 4.6 feet below the top of the dam with water flowing over the stop planks.

#### b. Dam

Top of Dam - The sparsely vegetated top of the dam is irregular and gradually sloping down from the spillway toward both abutments.

Upstream Slope - The upstream slope is very steep and irregular. Riprap is lacking at and above the normal pool elevation thus allowing wave action and surface runoff to erode the slope (Photo 1).

Downstream Slope - The downstream slope is irregular and steep (1.4H:1V). Toward the bottom of the embankment to each side of the spillway, berms exist with a somewhat flatter slope. The grass cover on the slope is thin, especially toward the right abutment where brush was recently cut (Photo 2). There are areas of minor erosion near the top of the embankment. Wet areas exist at the toe of the embankment at the left abutment (Photo 4) and to the right of the spillway (Photo 3). Trees and brush are growing on the right abutment.

Spillway - The masonry spillway crest and stop planks are in good condition although the steel stanchions are somewhat deteriorated. The approach channel has been backfilled and graded with gravel to the top of the stop planks. No obstructions of the approach channel or crest were observed. The concrete training walls adjacent to the spillway crest are cracked, with openings up to 1 inch (Photo 7). The right wingwall showed minor seepage from the masonry joints in the area where it abuts the masonry spillway wall. No seeps could be observed from the masonry spillway wall due to the water flowing over the top of the stop planks. Grass is growing from the joints of the masonry wingwall (Photo 5).

Emergency Spillway - Soil has been placed in the emergency spillway thus preventing flow from entering the channel. Trees, up to 8 inches in diameter, and brush are growing within and on the embankments of the emergency spillway channel.

c. Appurtenant Structures - The low-level outlet gate operated easily although it leaks slightly allowing a 1 inch deep flow through the 24 inch pipe. The penstock gate could not be operated because the key was removed from the wheel to prevent accidental closure. The penstock is controlled by a valve at the water wheel within the factory building. This valve is functional although it

leaks slightly from the handle stem. Both the low-level and penstock hand wheel pedestal lift gates are protected by individual gatehouse structures. The service bridges to the gatehouses are in good condition. The concrete deck of the spillway bridge is badly deteriorated and the steel reinforcing is exposed and rusting. A 6 foot chain link fence with locking gates prevents trespassing. The gatehouses are in need of paint.

From the area of and below the spillway channel bridge there are four 5 inch diameter clay pipes protruding from the masonry walls of the spillway channel. From the right wall there are three pipes. Two of these pipes are dry and the third, which appears to be a toe drain for the right side of the dam, had a flow of 1.25+ gpm at the time of the inspection. The left wall has one 5 inch clay pipe under the bridge which appears to be a toe drain for the left side of the dam. This pipe had a flow of 0.65+ gpm at the time of the inspection. Flow from the two pipes, which seem to be toe drains, appeared clear. However, residues of orange clay-like matter 2-1/2 inches thick in the right pipe and somewhat less in the left pipe were observed (Photo 8).

d. Reservoir Area - The area surrounding the pond is generally residential with some lake front houses on the north and west sides. The Bevins Manufacturing Company is located at the toe of the dam. Lake Pocotopaug, a much larger lake, is located just north of the pond.

e. Downstream Channel - The downstream channel is a concrete and masonry rectangular flume which passes under the Bevins factory building and back into the natural streambed of the Pocotopaug Creek (Photo 6). It was not possible to inspect the section of the channel under the Bevins building.

### 3.2 EVALUATION

Based upon the visual inspection, the project is assessed as being in fair condition. The manner in which the features identified in Section 3.1 could affect the future condition and/or stability of the project is as follows:

1. Due to its steepness and the lack of riprap, erosion of the upstream slope will continue.
2. Water can collect in the cracks of the concrete spillway training walls thus making it susceptible to further deterioration by freeze-thaw cycles.
3. Sloughing of the downstream slope could occur, due to its steepness.
4. The thin grass cover on the dam will not prevent further erosion by surface runoff.
5. The emergency spillway may not operate properly if the pond level rises to an emergency stage.

6. Stanchions supporting the stop planks will further deteriorate resulting in possible failure.
7. Wet areas at the toe of the dam are an indication of seepage through the dam.
8. Trees at the right abutment of the dam could be uprooted, causing damage to the dam and tree roots could provide seepage paths through the dam.
9. Further deterioration of the spillway bridge deck could compromise its stability.
10. When the penstock valve in the factory building is in a closed position, the penstock pipe is under a constant head of water.

## SECTION 4: OPERATIONAL AND MAINTENANCE PROCEDURES

### 4.1 OPERATIONAL PROCEDURES

a. General - Lake level is observed daily, but not documented, to maintain the water elevation to the top of the stop planks (el. 459). When heavy rain is forecast Pocotopaug Lake and Bevins Pond water levels are drawn down as much as 18 inches to provide additional water storage. The low-level outlet gate remains closed during normal pool. The penstock gate, at the lake, remains open and flow is regulated by a valve at the water wheel within the factory.

b. Description of Any Formal Warning System in Effect -No formal warning system is in effect.

### 4.2 MAINTENANCE PROCEDURES

a. General - The owner performs regular maintenance of the dam which includes cutting the grass and brush on the dam. The owner performs periodic informal inspections of the dam.

b. Operating Facilities - Low-level and penstock gates are operated periodically and maintained as needed by the owner. The penstock valve at the water wheel is also operated and maintained periodically.

### 4.3 EVALUATION

The operation and maintenance procedures are generally fair. A formal program of operations and maintenance procedures should be implemented, including documentation to provide complete records for future reference. Also, a formal warning system should be developed and implemented within the time frame indicated in Section 7.1c. Remedial operation and maintenance recommendations are presented in Section 7.

## SECTION 5: EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

### 5.1 GENERAL

The Bevins Pond Dam watershed is 4.63 square miles of rolling, wooded terrain. Pocotopaug Lake, an upstream impoundment, contributes a significant reduction in peak inflows to Bevins Pond.

The dam is an earth embankment with a masonry spillway. It is basically a low surcharge storage - high spillage type project. The available storage reduces the outflow from a Probable Maximum Flood (PMF) from 3800 cubic feet per second (cfs) to 3700 cfs but it does not create a significant reduction in the  $\frac{1}{2}$  PMF inflow of 1200 cfs.

### 5.2 DESIGN DATA

No computations could be found for the original design of the dam.

### 5.3 EXPERIENCE DATA

The emergency spillway was dug when the dam began overtopping in 1938.

### 5.4 VISUAL OBSERVATION

The top of the dam embankment, at elevation 463.3, slopes down to low points from the right and left of the spillway. The right low point is at elevation 461.3 and the left is at elevation 461.8.

### 5.5 TEST FLOOD ANALYSIS

Based upon the U.S. Army Corps of Engineers "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March, 1978; the watershed classification (Rolling), the watershed area of 4.63 square miles, and the reduction in flows contributed by Pocotopaug Lake a PMF of 3800 cfs or 820 cfs per square mile is estimated at the damsite. In accordance with the size (small) and hazard (high) classification, the range of test floods to be considered is from the  $\frac{1}{2}$  PMF to the PMF. Based on the degree of hazard associated with a breach of the dam, the test flood for Bevins Pond Dam is equivalent to the PMF. The pond level at the start of the test flood is considered to be at elevation 459 at the top of the stop planks. The peak outflow for the test flood is estimated at 3700 cfs and this flow will overtop the lowest point of the dam by 2.5 feet. Based on hydraulics computations, the spillway capacity is 250 cfs (with the pond elevation at the lowest point of the dam) which is equivalent to 6.8% of the routed test flood outflow (Appendix D-7).

## 5.6 DAM FAILURE ANALYSIS

The dam failure analysis is based on the April, 1978 Army Corps of Engineers "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs". With the pond level at the lowest point of the dam, peak outflow before failure of the dam would be about 250 cfs and the peak failure outflow from the dam breaching would total about 31,000 cfs. A breach of the dam would result in a rise in the water level of the stream at the initial impact area, from a negligible depth just before the breach to a depth of about 11 feet shortly after the breach. This rapid, 11 foot increase in water level will inundate the Bevins Manufacturing Company's complex located immediately downstream of the dam by 6 or more feet, possibly causing the loss of more than a few lives as well as substantial economic loss (Appendix D-9). Based on the dam failure analysis, Bevins Pond Dam is classified as a high hazard dam.

## **SECTION 6: EVALUATION OF STRUCTURAL STABILITY**

### **6.1 VISUAL OBSERVATIONS**

The visual inspection did not reveal any indications of immediate stability problems. There are areas of seepage, deterioration, and erosion, as described in Section 3, however they are not considered stability concerns at the present time.

### **6.2 DESIGN AND CONSTRUCTION DATA**

No information was available.

### **6.3 POST-CONSTRUCTION CHANGES**

During heavy rains in 1938 the dam was overtopped near the left abutment and the emergency spillway was constructed. When the water subsided repairs were made to the eroded area where the overtopping had occurred. Two 4" PVC pipes were installed along the downstream toe of the dam to carry water from the wet area at the left abutment to the spillway channel (See Sheet B-1). These repairs represent an improvement in the stability of the dam.

It is not known if the permanent stop planks on the spillway crest were included in the original design of the dam or added at some later date. Nor is it known if their effect on the stability of the spillway was ever assessed.

### **6.4 SEISMIC STABILITY**

The dam is in seismic Zone 1 and according to Army Corps of Engineers Recommended Guidelines, need not be evaluated for seismic stability.

## SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

### 7.1 PROJECT ASSESSMENT

a. Condition - Based upon the visual inspection of the site and past performance, the project appears to be in fair condition with areas which require maintenance, repair and monitoring. No evidence of immediate structural instability was observed in the dam, spillway, or appurtenant structure.

Based upon "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March 1978, the watershed area and classification, and hydraulic/hydrologic computation, the peak inflow to the reservoir is 3800 cfs; peak outflow is 3700 cfs with the lowest point of the embankment overtopped by 2.5 feet. The spillway capacity to the low point of the embankment is 250 cfs which is equivalent to approximately 6.8% of the routed test flood outflow.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the project must be based solely on visual inspection, past performance and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be implemented within 1 (one) year of the owner's receipt of this report.

### 7.2 RECOMMENDATIONS

It is recommended that further studies be made by a registered professional engineer qualified in dam design and inspection pertaining to the following items. Recommendations made by the engineer should be implemented by the owner.

1. A detailed hydraulic/hydrologic analysis of the adequacy of the project discharge and existing outlet facilities. This analysis should include investigating the advisability of removing the permanent stop planks for increased spillway capacity and an evaluation of the adequacy of the emergency spillway.
2. Regrading of the upstream slope and placement of riprap to prevent further erosion due to wave action.
3. Regrading of the downstream slope to a more uniform inclination. Slopes should then be mulched and seeded to prevent erosion.
4. A complete geotechnical and hydraulic rehabilitation and stabilization of the emergency spillway.

5. Inspection and evaluation of the low-level and penstock conduits and gate valves.
6. Determination of the existence of toe drains. If toe drains exist they should be evaluated and replaced if necessary.
7. Determination of the origin and significance of wet areas at the toe of the dam.
8. An assessment of the effect of the stop planks on the stability of the spillway.
9. Repair of the spillway bridge deck.

### 7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken by the owner within the length of time indicated in Section 7.1.c, and continued on a regular basis:

1. Round-the-clock surveillance should be provided during periods of heavy precipitation or high project discharges.
2. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference.
3. A comprehensive program of inspection by a registered professional engineer qualified in dam inspection should be instituted on an annual basis. Prior to the inspections, the pond level should be lowered enough to allow for inspection of the masonry spillway under no flow conditions.
4. Cracks in the concrete of the spillway training walls should be repaired.
5. Grass growing through the joints of the wing walls should be removed and joints repointed.
6. The vegetative cover on the dam should be made denser to prevent further erosion of slopes.
7. Gatehouses should be painted.
8. At the right abutment, on the downstream slope, trees and brush should be removed.

9. The valve for the 36 inch penstock should be operated from the upstream side of the dam to relieve pressure on the conduit through the dam.

#### 7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

**APPENDIX A**  
**INSPECTION CHECKLIST**

**VISUAL INSPECTION CHECK LIST  
PARTY ORGANIZATION**

PROJECT Levins Pond Dam

DATE: July 7, 1980

TIME: 9:30 AM

WEATHER: 75° Sunny

W.S. ELEV. 459' U.S.          DN.S

<u>PARTY:</u>	<u>INITIALS:</u>	<u>DISCIPLINE:</u>
1. <u>Peter Heynen</u>	<u>PH</u>	<u>Cohn Geotechnical</u>
2. <u>Timothy Kavanaugh</u>	<u>TK</u>	<u>Cohn Geotechnical</u>
3. <u>Hector Moreno</u>	<u>HM</u>	<u>Cohn Hydraulics</u>
4. <u>Robert Jahn</u>	<u>RJ</u>	<u>Cohn Hydraulics</u>
5. <u>Timothy Kavanaugh</u>	<u>TK</u>	<u>Cohn Survey</u>
6. <u>Moshe Nerman</u>	<u>MN</u>	<u>Cohn Survey</u>

<u>PROJECT FEATURE</u>	<u>INSPECTED BY</u>	<u>REMARKS</u>
1. <u>Earth Embankment</u>	<u>PH, TK, HM, RJ</u>	<u>Fair Condition</u>
2. <u>24 inch Low-level Outlet</u>	<u>PH, TK, HM, RJ</u>	<u>Slight leakage</u>
3. <u>36 inch Penstock</u>	<u>PH, TK, HM, RJ</u>	<u>Fair Condition</u>
4. <u>Masonry Spillway</u>	<u>PH, TK, HM, RJ</u>	<u>Fair Condition</u>
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____
11. _____	_____	_____
12. _____	_____	_____

PERIODIC INSPECTION CHECK LIST

Page A-2

PROJECT Bevins Pond Dam

DATE 7-7-80

PROJECT FEATURE Earth embankment

BY CH, IK, HM, RJ

AREA EVALUATED	CONDITION
<b><u>DAM EMBANKMENT</u></b>	
Crest Elevation	463.6 ±
Current Pool Elevation	459 ±
Maximum Impoundment to Date	
Surface Cracks	None
Pavement Condition	Grass Covered
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Heavy brush and tree growth at right abutment.
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Minimal (Area Fenced)
Sloughing or Erosion of Slopes or Abutments	None observed
Rock Slope Protection-Riprap Failures	Upstream slope lacking rip rap at pool-level and above
Unusual Movement or Cracking at or Near Toes	None observed
Unusual Embankment or Downstream Seepage	Wet areas at toe near left abutment and toe right of spillway
Piping or Boils	None observed
Foundation Drainage Features	Possible existence of toe drains
Toe Drains	
Instrumentation System	None

PERIODIC INSPECTION CHECK LIST

Page A-3

PROJECT Bevins Pond Dam

DATE 7-7-80

PROJECT FEATURE 24 inch low-level outlet BY PH, TK, HM, RL

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS-OUTLET STRUCTURE AND</u> <u>OUTLET CHANNEL</u></p>	
<p>General Condition of <sup>Masonry</sup> <del>Concrete</del></p>	<p>Fair - water flowing over spillway made it impossible to check for seepage</p>
<p>Rust or Staining</p>	<p>Rust staining on spillway apron in area of low-level outlet.</p>
<p>Spalling</p>	<p>NA</p>
<p>Erosion or Cavitation</p>	<p>NA</p>
<p>Visible Reinforcing</p>	<p>NA</p>
<p>Any Seepage or Efflorescence</p>	<p>1 inch deep flow of water through 24 inch pipe.</p>
<p>Condition at Joints</p>	<p>NA</p>
<p>Drain Holes</p>	<p>NA</p>
<p>Channel</p>	<p>Fair</p>
<p>Loose Rock or Trees Overhanging Channel</p>	<p>None</p>
<p>Condition of Discharge Channel</p>	<p>Fair - Grass growing from joints of masonry channel walls.</p>

PERIODIC INSPECTION CHECK LIST

Page A-A

PROJECT Bevins Pond Dam

DATE 7-7-80

PROJECT FEATURE 36 inch Penstock

BY PH, TK, HM, RJ

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL</u>	
General Condition of Concrete	NA
Rust or Staining	NA
Spalling	NA
Erosion or Cavitation	NA
Visible Reinforcing	NA
Any Seepage or Efflorescence	Slight leakage from valve handle stem. Unable to see outlet.
Condition at Joints	NA
Drain Holes	NA
Channel	Under Bevins factory building unable to inspect.
Loose Rock or Trees Overhanging Channel	NA
Condition of Discharge Channel	Under Bevins factory building unable to be inspected.
	A water wheel is at the end of the 36 inch penstock and located within the Bevins factory building. A hand operated valve at the waterwheel is used to regulate flow through the penstock although there is a functional gate valve in the pond. This allow the factory to draw water from the penstock for manufacturing purposes.

PERIODIC INSPECTION CHECK LIST

Page A-5

PROJECT Bevins Pond Dam

DATE 7-7-80

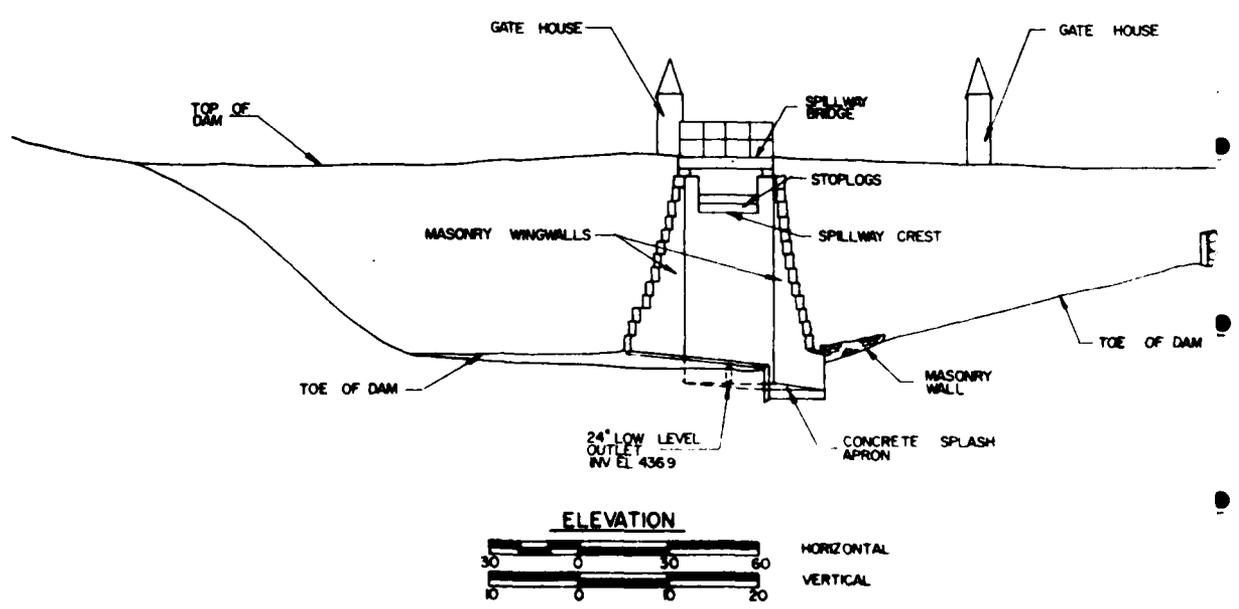
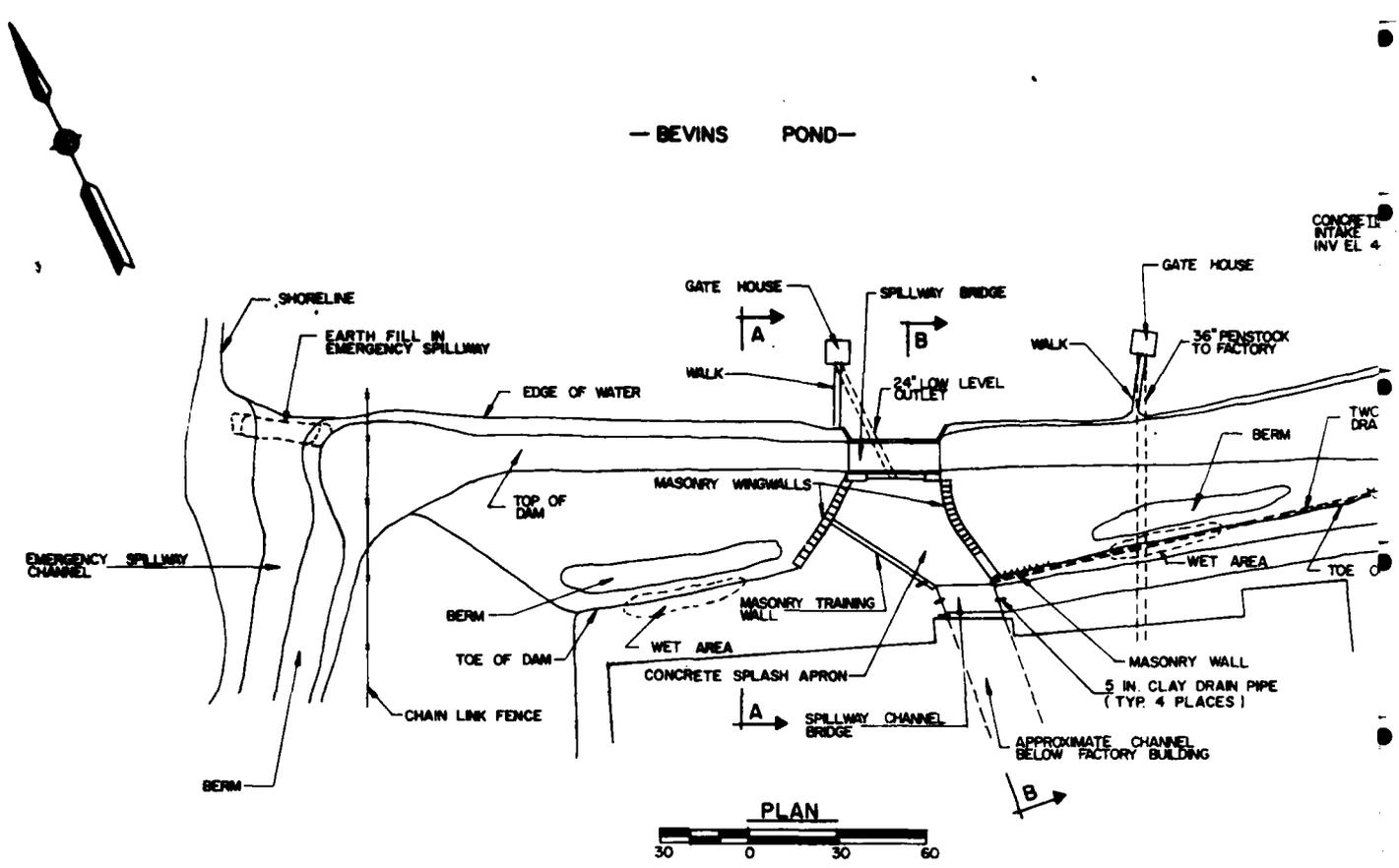
PROJECT FEATURE Masonry Spillway

BY PH, TK, HM, RJ

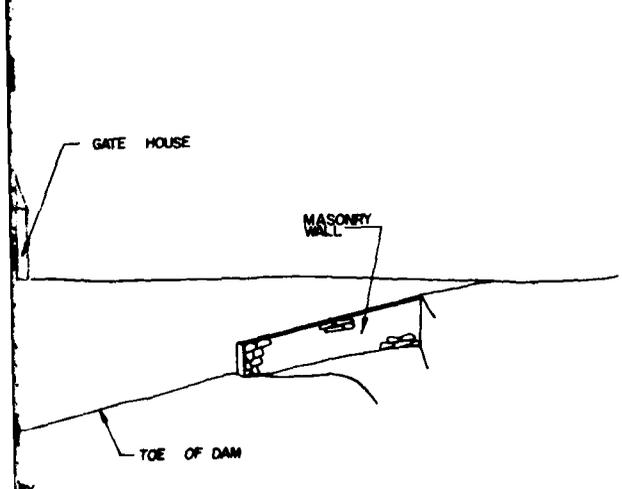
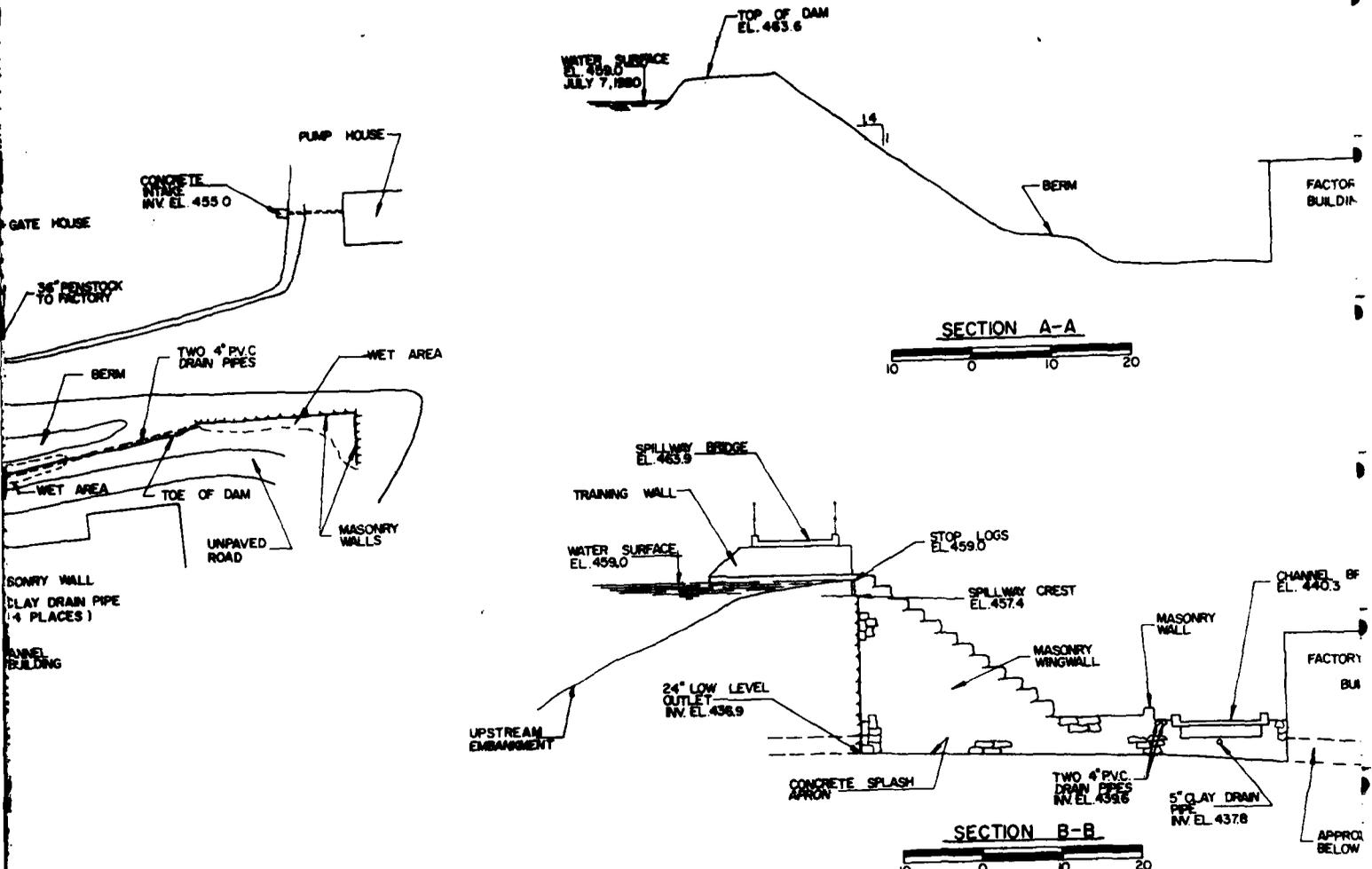
AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u></p>	
<p>a) <u>Approach Channel</u>                      General Condition                      Loose Rock Overhanging Channel                      Trees Overhanging Channel                      Floor of Approach Channel</p>	<p>Fair                      None                      None                      shallow - gravel</p>
<p>b) <u>Weir and Training Walls</u>                      General Condition of Concrete                      Rust or Staining                      Spalling                      Any Visible Reinforcing                      Any Seepage or Efflorescence                      Drain Holes</p>	<p>Cracks and slight displacement of training walls                      None                      observed on training walls and spillway bridge.                      Visible on spillway bridge deck.                      None observed                      NA</p>
<p>c) <u>Discharge Channel</u>                      General Condition                      Loose Rock Overhanging Channel                      Trees Overhanging Channel                      Floor of Channel                      Other Obstructions</p>	<p>Fair                      None                      None                      concrete in fair condition                      Discharge channel is routed beneath the Bevins factory building.                      seepage observed from right masonry wingwall.</p>

**APPENDIX B**  
**ENGINEERING DATA AND CORRESPONDENCE**

- BEVINS POND -



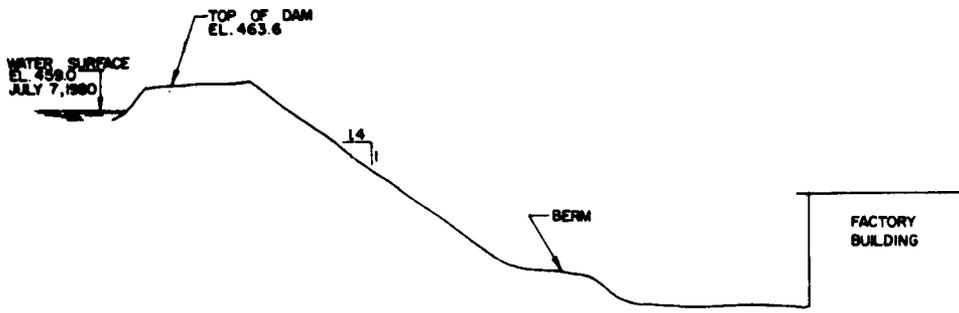
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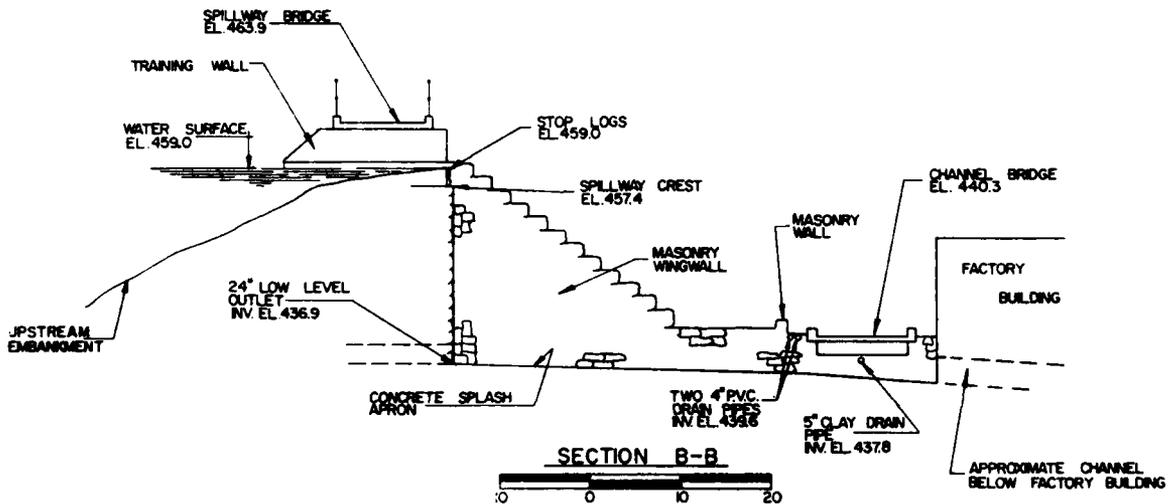
**NOTES:**

1. THIS PLAN WAS COMPILED FROM CANN ENG OF THE DAM DATED JULY 7, 1980. DIMENSIONS SHOWN ARE APPROXIMATE. NOT AND/OR STRUCTURAL FEATURES ARE NECESSA
  2. NO ELEVATIONS WERE AVAILABLE FOR THE I THE WATER SURFACE ELEVATION OF 459.0 SHOWN ON THE U.S.G.S. MIDDLE HADDAM AND QUADRANGLE MAPS WAS ASSUMED TO BE ELEVATION OF THE TOP OF STOP PLANKS
- ALL OTHER ELEVATIONS SHOWN ARE REFER ASSUMED STOP PLANK ELEVATION.

CAHN ENGINEERS INC WALLINGFORD, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER CORPS OF EN WALTHAM
NATIONAL PROGRAM OF INSPECTION OF PLAN, ELEVATION AND SECT	
<b>BEVINS POND DAM</b>	
POCOTOPING CREEK E HAMPTO	
DRAWN BY M. H. ...	CHECKED BY J. K. ...
APPROVED BY V. M. H.	SCALE AS SH DATE JULY 1980



SECTION A-A  
 0 10 20



SECTION B-B  
 0 10 20

**NOTES:**

1. THIS PLAN WAS COMPILED FROM CAHN ENGINEERS INSPECTION OF THE DAM DATED JULY 7, 1980. DIMENSIONS SHOWN ARE APPROXIMATE. NOT ALL TOPOGRAPHIC AND/OR STRUCTURAL FEATURES ARE NECESSARILY IDENTIFIED.
  2. NO ELEVATIONS WERE AVAILABLE FOR THE DAM, THEREFORE THE WATER SURFACE ELEVATION OF 459.0 FOR THE POND SHOWN ON THE U.S.G.S. MIDDLE HADDAM AND MOODUS QUADRANGLE MAPS WAS ASSUMED TO BE THE NGVD ELEVATION OF THE TOP OF STOP PLANKS
- ALL OTHER ELEVATIONS SHOWN ARE REFERENCED TO THE ASSUMED STOP PLANK ELEVATION.

CAHN ENGINEERS INC. WALLINGFORD, CONNECTICUT ENGINEER	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS PLAN, ELEVATION AND SECTIONS	
<b>BEVINS POND DAM</b>	
POCOTOPUNG CREEK      E HAMPTON CONNECTICUT	
DRAWN BY <i>M. Norman</i>	CHECKED BY <i>TJK</i>
APPROVED BY <i>Vmd</i>	SCALE AS NOTED
DATE JULY 1980	SHEET B-1

CONN. 8718-ES

REPORT ON THE INSPECTION AND REVIEW  
OF EXISTING DAMS ON POCOTOPUG CREEK  
JULY 11, 1963

3. SL - 30.0 - P3.2 - P3.8  
BEVIN BROS. POND, EAST HAMPTON

DAM AND MASONRY SPILLWAY IN SOUND CONDITION. THE HEIGHT OF THE FLASHBOARDS HAVE BEEN REDUCED FROM 2'-0" TO 1'-8" SINCE OUR LAST INSPECTION. THE THEORETICAL SPILLWAY CAPACITY WITH FLASHBOARDS REMOVED IS 900 CFS. WITH FLASHBOARDS IN PLACE THIS REDUCES TO 630 CFS. WE RECOMMEND THAT ASSURANCE BE OBTAINED THAT PERSONNEL IS AVAILABLE AT ALL TIMES TO REMOVE THE FLASHBOARDS IN THE EVENT OF AN EMERGENCY, OR THAT THE FLASHBOARDS BE RE-DESIGNED AS A SELF-RELEASING TYPE.

**APPENDIX C**  
**DETAIL PHOTOGRAPHS**

— BEVINS POND —

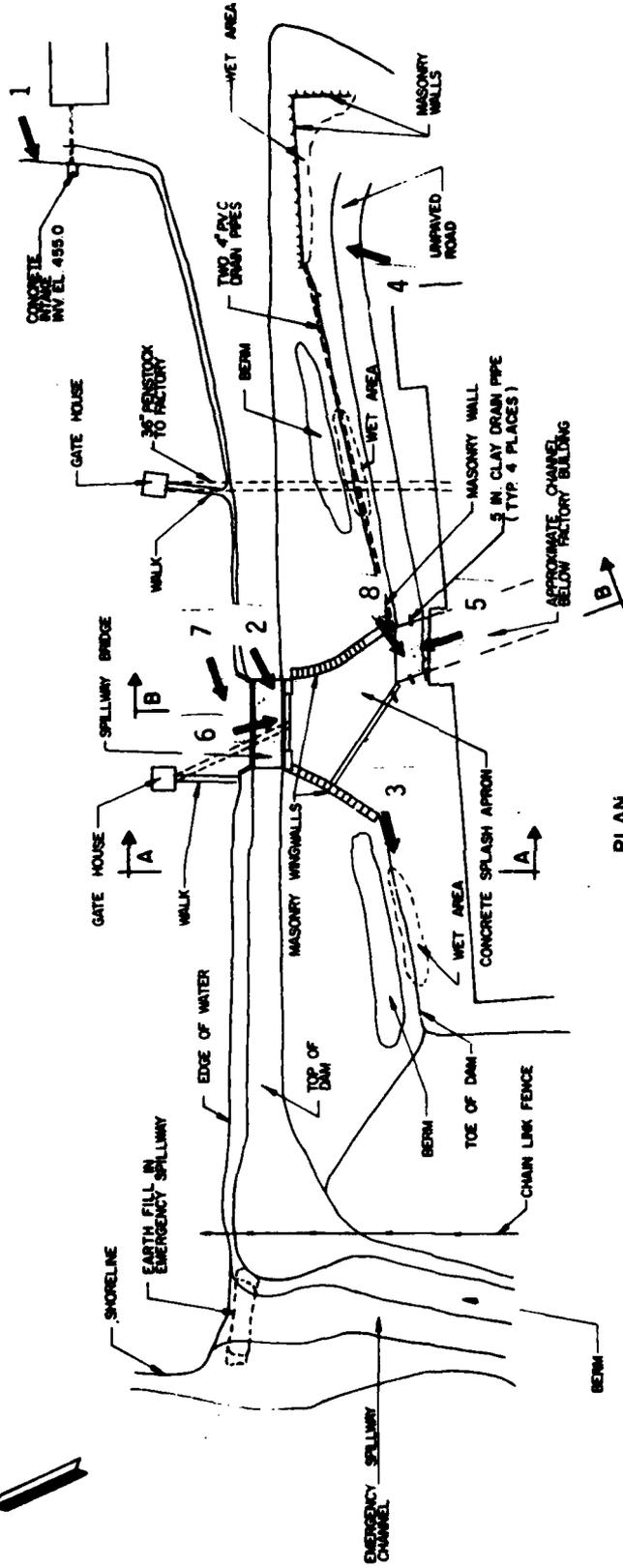
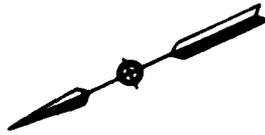


PHOTO LOCATION PLAN

BEVINS POND DAM

SHEET C-1



Photo 1 - Upstream slope of dam and gatehouse structures (7/7/80).



Photo 2 - Downstream slope to right of spillway. Note boulders, erosion, and irregularities of slope (7/7/80).

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CAHN ENGINEERS INC.  
WALLINGFORD, CONN.  
ENGINEER

NATIONAL PROGRAM OF  
INSPECTION OF  
NON-FED. DAMS

Bevins Pond Dam  
Pocotopaug Creek  
East Hampton, Conn.

CE# 27 785 KB  
DATE July '80 PAGE C-1

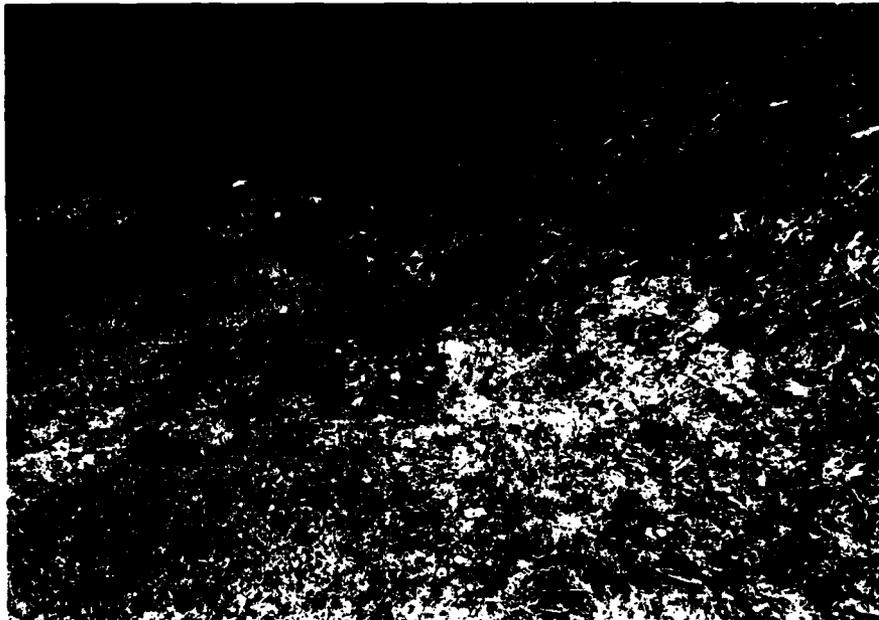


Photo 3 - Wet area at toe of downstream slope to the right of the spillway (7/7/80).



Photo 4 - Wet area at toe of dam near left abutment (7/7/80).

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NATIONAL PROGRAM OF  
INSPECTION OF  
NON-FED. DAMS

Bevins Pond Dam  
Pocotopaug Creek  
East Hampton, Conn.  
CE#27 785 KB  
DATE July '80 PAGE C-2



Photo 5 - Downstream side of masonry spillway structure. Note 24" low-level outlet at toe of spillway wall (7/7/80).



Photo 6 - Spillway channel (7/7/80).

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INSPECTION OF  
NON-FED. DAMS

Bevins Pond Dam  
Pocotopaug Creek  
East Hampton, Conn.  
CE#27 785 KB  
DATE July '80 PAGE C-3



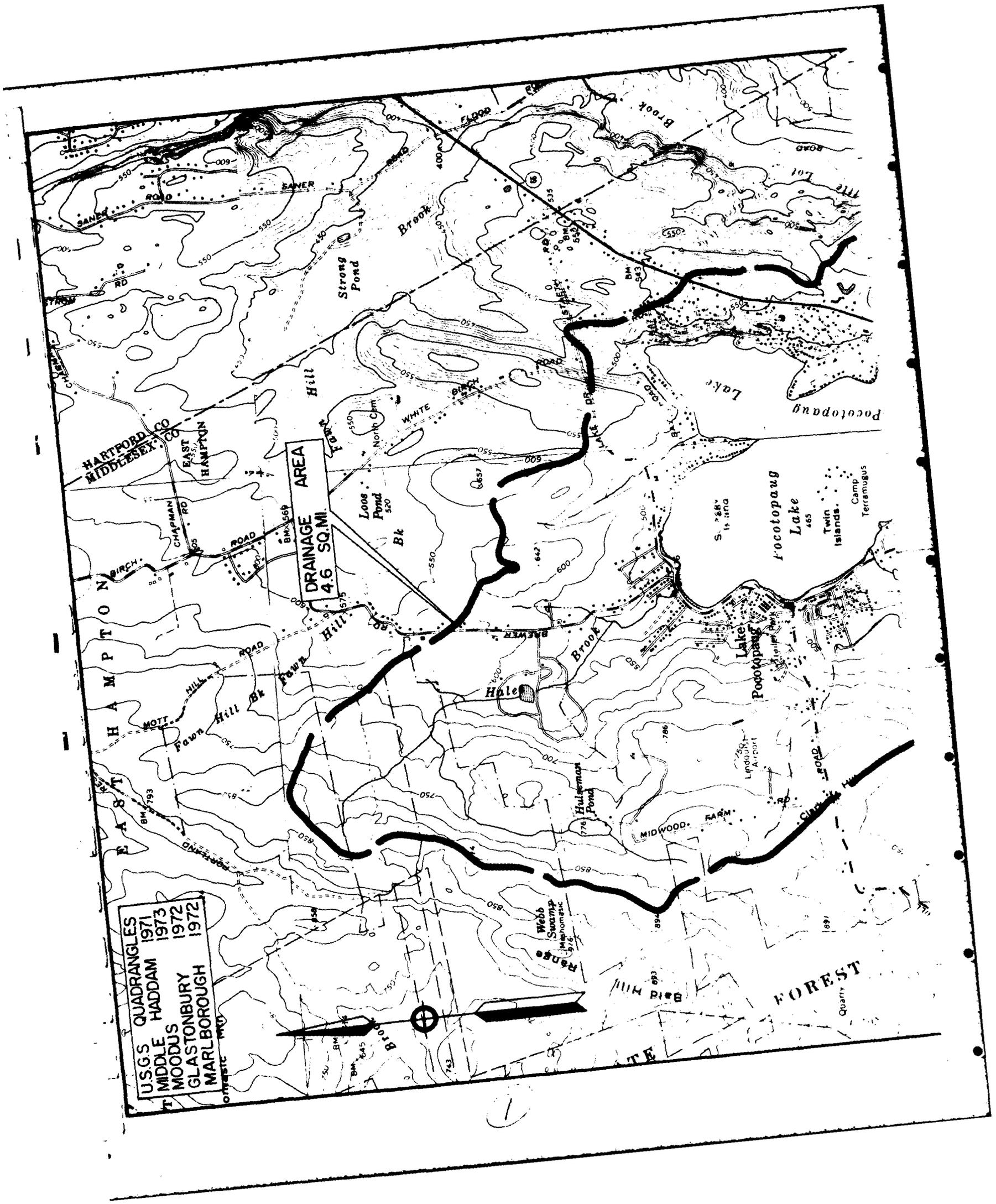
Photo 7 - Cracks and displacement of right spillway training wall (7/7/80).



Photo 8 - Possible right toe drain, 5 inch clay, outlet pipe. Note orange clayey residue build-up in pipe and on wall.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	Bevins Pond Dam Pocotopaug Creek East Hampton, Conn. CE# 27 785 KB DATE July '80 PAGE C-4
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER		

**APPENDIX D**  
**HYDRAULICS/HYDROLOGIC COMPUTATIONS**



**DRAINAGE AREA**  
4.6 SQ. MI.

U.S.G.S. QUADRANGLES  
 MIDDLE HADDAM 1971  
 MOODJUS 1972  
 GLASTONBURY 1972  
 MARLBOROUGH 1972



HARTFORD CO  
 MIDDLESEX CO  
 EAST HAMPTON

EAST HAMPTON  
 MOTT  
 FAWN HILL BK  
 CHAPMAN RD  
 BIRCH RD

HILL  
 FAWN HILL BK  
 Bk  
 Loos Pond  
 Strong Pond

Hale

Brook

MIDWOOD FARM

Pocotopaug Lake

Sky Island

Twin Islands

Camp Terramugus

Pocotopaug Lake

Lynnhurst Airport

FOREST  
 Quarry

Bald Hill

Webb Swamp  
 Monument

Hulleman Pond

Brook

Loos Pond

Strong Pond

Brook

Brook

Brook

Little Lot

Lake

Pocotopaug Lake

Pocotopaug Lake

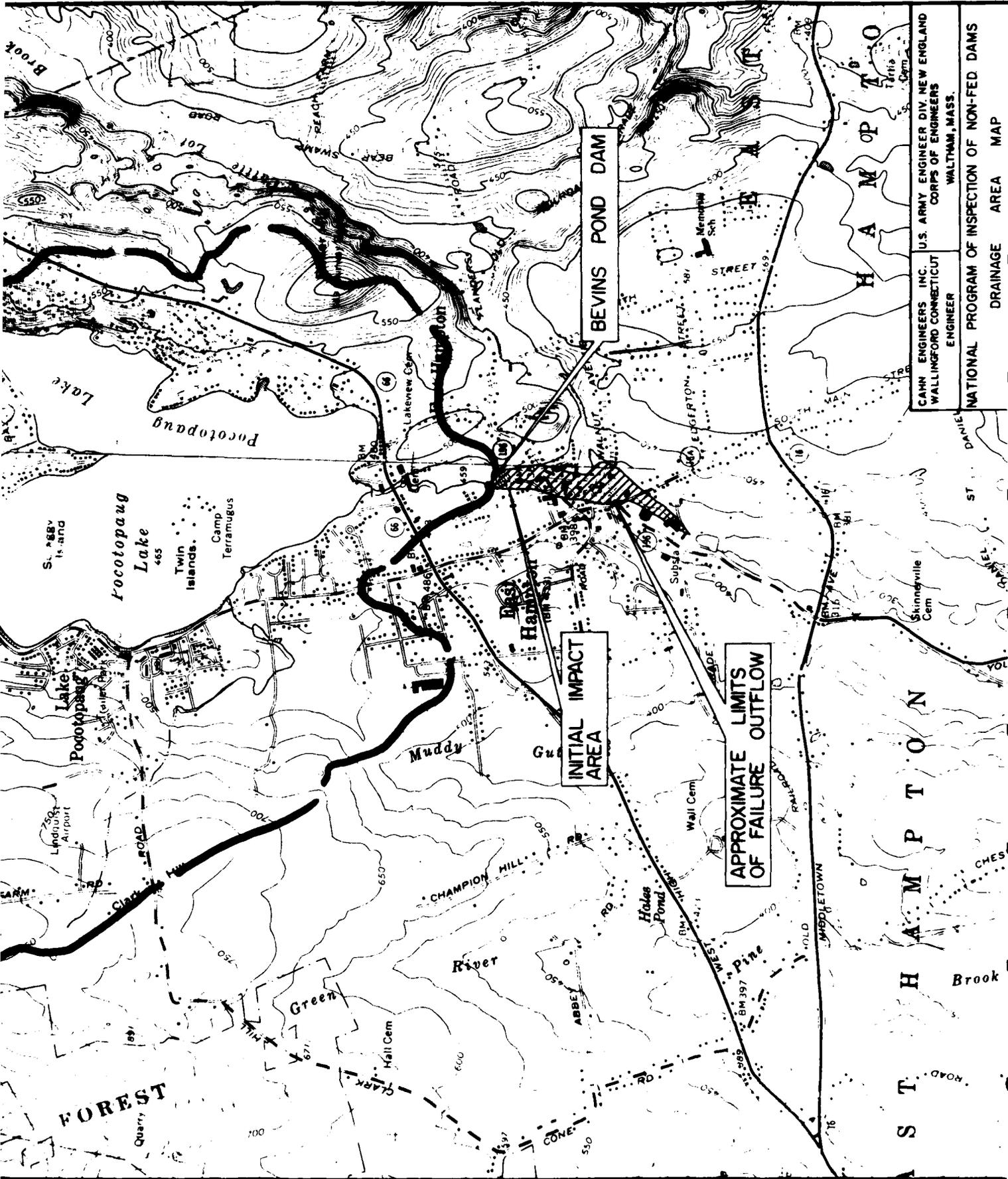
Chapman Hill

FOREST

Quarry

Quarry

Quarry



BEVINS POND DAM

INITIAL IMPACT AREA

APPROXIMATE LIMITS OF FAILURE OUTFLOW

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U.S. ARMY ENGINEER DIV. NEW ENGLAND  
CORPS OF ENGINEERS  
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS  
DRAINAGE AREA MAP

H A M P T O N

H A M P T O N

Brook

H A M P T O N

FOREST

Pototopaug Lake

Pototopaug Lake

BEVINS POND DAM

Muddy

River

CHAMPION HILL

East Hampton

Holes Pond

Pine

Wall Cem

Hall Cem

CONE

ROAD



Project INSPECTION OF NON-FEDERAL DAMS IN NEW ENGLAND Sheet D-1 of 11  
 Computed By WLL Checked By GAJ Date 7/1/75  
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## HYDROLOGIC / HYDRAULIC INSPECTION

### BEVINS POND DAM, EAST HAMPTON, CT.

#### 1) PERFORMANCE AT PEAK FLOOD CONDITIONS

##### 1) PROBABLE MAXIMUM FLOOD (PMF)

a) WATERSHED CLASSIFIED AS "ROLLING"

b) WATERSHED AREA:

THE DAM IS LOCATED ON POCOTOPAUG CREEK JUST  $\frac{1}{2}$  MI FROM POCOTOPAUG LAKE. THE TOTAL WATERSHED IS SUBDIVIDED AS FOLLOWS:

- i) D.A. TO POCOTOPAUG LAKE OUTLET (DAM):  $(DA)_{\text{L}} = 4.52 \text{ sq mi}$
- ii) INCREMENT TO BEVINS POND DAM:  $\Delta(DA)_{\text{DP}} = 0.11 \text{ sq mi}$
- iii) TOTAL D.A. TO BEVINS POND DAM:  $(DA)_{\text{DP}} = 4.63 \text{ sq mi}$

##### c) PEAK FLOODS (FROM NED-ACE GUIDELINES-GUIDE CURVES FOR PMF):

POCOTOPAUG LAKE COVERS (2) 18% OF ITS WATERSHED AND THEREFORE, HAS POTENTIALLY, A SIGNIFICANT EFFECT IN THE REDUCTION OF PEAK INFLOWS TO BEVINS POND DAM.

THIS PEAK INFLOW REDUCTION WAS ESTIMATED BY THE APPROXIMATE ROUTING NED-ACE GUIDELINES ALTERNATE METHOD "SURCHARGE STORAGE ROUTING" AND 19" MAX. PROBABLE P.D. IN NEW ENGLAND.

\*NOTE: DRAINAGE AREA OF LAKE POCOTOPAUG FROM (CONN. DEP BULLETIN NO. 1 (GAZETTEER OF NATURAL DRAINAGE AREAS) P. 41. INCREMENTAL D.A. TO BEVINS POND FROM U.S.G.S MIDDLE HADDAM, CT. (1971) AND MOODUS, CT. (1973) QUADRANGLE SHEETS - SCALE 1:2000'

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THE FOLLOWING ASSUMPTIONS WERE MADE AT POCOTPAUG LAKE:

- (i) NORMAL WATER SURFACE AT ELEV. 165' NGVD (MSL ON USGS QUAD SHEETS) AT SPILLWAY CREST.\*
- (ii) SPILLWAY AT TWO LEVELS PROVIDING (1) 28' (SAY, 30') AND 20' LENGTHS WITH 20" AND 14" DEPTHS TO TOP OF DAM, RESPECTIVELY. (SEE INSPECTION REPORT DATED JULY 11, 1963).
- (iii) SLOPING TERRAIN TO THE RIGHT AND LEFT OF THE SPILLWAY ON 40" AND 10" TO 1", RESPECTIVELY. (FROM U.S.G.S. MIDDLE HADAM, CT. (1971), QLMR SHEET)
- (iv) DISCHARGE COEFFICIENT  $C = 3.0$  FOR THE ENTIRE OVERFLOW PROFILE.
- (v) AVERAGE LAKE AREA WITHIN EXPECTED SURCHARGE DEPTHS, MEASURED ON THE USGS, MIDDLE HADAM AND MOODUS QUAD SHEETS.

THEREFORE, THE POCOTPAUG LAKE DAM OUTFLOW IS APPROXIMATED BY THE FOLLOWING RATING CURVE EQUATION:

$$Q_{PL} = 90H^{3/2} + 60(N-1.17)^{3/2} + 60(N-1.67)^{5/2}$$

(SEE PP D-4 AND 5, FOR A SIMILAR EQUATION DEVELOPMENT)

A SUMMARY OF THE ROUTING OF PEAK INFLOWS TO BEVINS POND DAM, FOLLOWS:

NAME / LOCATION OF ROUTED FLOOD	(1) D.A. (SQ. MI.)	CSM (CFS/SQ.MI.)	AVE. LAKE AREA (AC)	PMF (CFS)		1/2 PMF (CFS)	
				PK. INFLOW	PK. OUTFLOW	PK. INFLOW	PK. OUTFLOW
POCOTPAUG LAKE	* 4.52	1900	525	8600	3500	4300	1000
BEVINS POND	* 0.11	3000	—	3800	(2) 3700	1200	(2) 1200

(1) DRAINAGE AREA. (\*) = TOTAL, (2) INCREMENTAL. (2) SEE P. D-6

\* NOTE: H.S. OF POCOTPAUG LAKE IS CONTROLLED BY THE LAKE'S DAM OWNER AND IS CLAIMED TO BE LOWERED (\*) 2' IN ANTICIPATION TO A MAJOR STORM, THUS FURTHER REDUCING THE ESTIMATED PEAK FLOODS (THIS REDUCTION IS NOT CONSIDERED IN THIS WORK)

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THE FLOOD FROM THE INCREMENTAL DRAINAGE AREA  $\frac{1}{2}$  FROM FORTIFICATION LAKE HAS BEEN ASSUMED TO PEAK SIMULTANEOUSLY WITH THE LAKE'S PEAK FLOODING.

THEREFORE, THE PEAK INFLOWS TO BEVINS POND ESTIMATED AT PMF = 3800 CFS AND  $\frac{1}{2}$  PMF = 4400 CFS ARE REDUCED BY FORTIFICATION LAKE TO (E) 3800 CFS AND 1200 CFS, RESPECTIVELY I.E., A PEAK FLOW REDUCTION OF (E) 57% FOR THE "PMF" AND (E) 73% FOR THE " $\frac{1}{2}$  PMF".

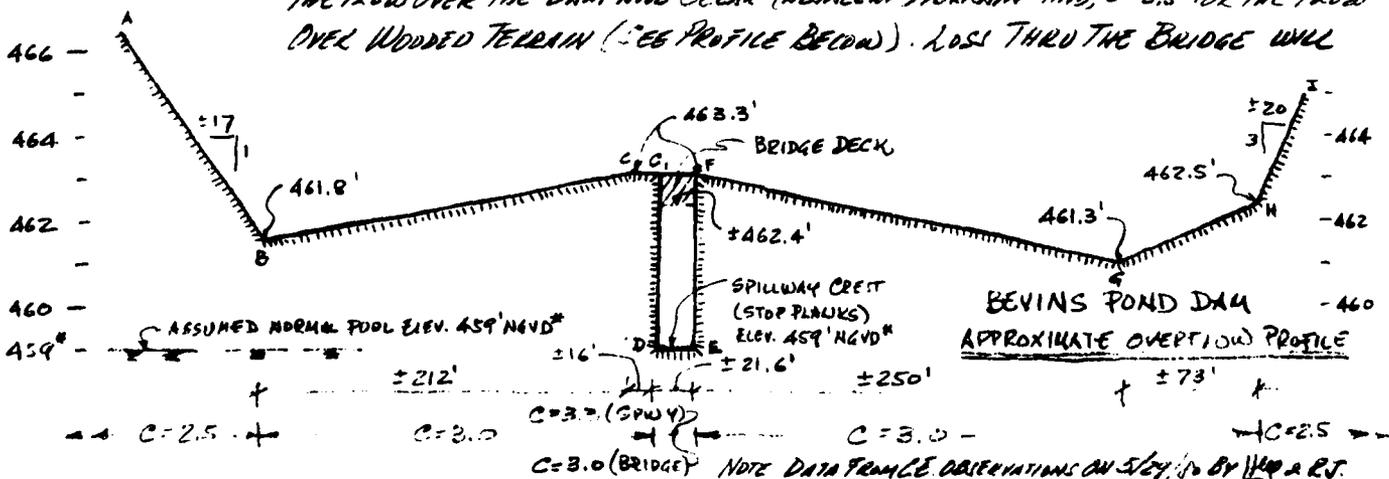
## 2) SURCHARGE AT PEAK INFLOWS

### a) OUTFLOW RATING CURVE

### c) SPILLWAY AND OVERFLOW PROFILE FOR SURCHARGES OVERTOPPING THE DAM:

SPILLWAY (S) 216' LONG WITH PERMANENT STOP PLANKS AND BRIDGE WITH 2-PIPE COLUMNS AT THE CENTER OF THE SPAN. BRIDGE LOW CHORD AT (H) ELEV. 462.4' NGVD.\*

THE APPROXIMATE SECTION SLOPES GRADUALLY TO LOW POINTS AT BOTH SIDES OF THE DAM. THE RIGHT SIDE DEPRESSION WAS MADE IN 1938 AS AN EMERGENCY MEASURE TO PREVENT OVERTOPPING. ASSUME  $C=3.3$  FOR THE SPILLWAY DISCHARGE;  $C=3.0$  FOR THE FLOW OVER THE DAM AND CLEAR (ADJACENT) TERRAIN AND,  $C=2.5$  FOR THE FLOW OVER WOODED TERRAIN (SEE PROFILE BELOW). LOSS THRU THE BRIDGE WILL



\* NOTE: W.S. ELEV. 459' MSL ON THE U.S.G.S. MIDDLE HOODAM, CT. QUAD. SHEET (KEN. 1471) IS ASSUMED TO BE SPILLWAY CREST ELEVATION ON NATIONAL GEODETIC VERTICAL DATUM (NGVD)

Project NON-FEDERAL DAMS INSPECTION

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BE TREATED AS WEIR (C=3.0) AND DITCH FLOW (C<sub>d</sub>=0.82).

(i) THEREFORE, THE OVERFLOW RATING CURVE FOR THE SURCHARGE (H<sub>1</sub>) ABOVE THE SPILLWAY CREST CAN BE APPROXIMATED AS FOLLOWS (SEE PROFILE P.D.3):

1) SECTION AB: \* Q<sub>AB</sub> = 0.4 x 17 x 2.5 (H<sub>1</sub> - 2.8)<sup>3/2</sup> = 17 (H<sub>1</sub> - 2.8)<sup>3/2</sup>

2) SECTION BC: (Q<sub>BC</sub>)<sub>1</sub> = 0.4 x 212/1.5 x 3.0 (H<sub>1</sub> - 2.8)<sup>3/2</sup> = 170 (H<sub>1</sub> - 2.8)<sup>3/2</sup>; H<sub>1</sub> ≤ 4.3'

(Q<sub>BC</sub>)<sub>2</sub> = 170 [(H<sub>1</sub> - 2.8)<sup>3/2</sup> - (H<sub>1</sub> - 4.3)<sup>3/2</sup>]; H<sub>1</sub> > 4.3'

3) SECTION CF (BRIDGE OVERTOP):

\* Q<sub>CF</sub> = 3.0 x 37.6 (H<sub>1</sub> - 4.3)<sup>3/2</sup> = 113 (H<sub>1</sub> - 4.3)<sup>3/2</sup>

\* (Q<sub>CF</sub>)' = 65 (H<sub>1</sub> - 4.3)<sup>3/2</sup>

4) SECTION C<sub>1</sub>F (BRIDGE UNDERFLOW):

Q<sub>C<sub>1</sub>F</sub> = 0.82 x 21.6 x H<sub>2</sub> √2g (ΔH) = 142 H<sub>2</sub> (ΔH)<sup>3/2</sup>

H<sub>2</sub> = H<sub>1</sub> - ΔH FOR H ≤ 3.4'; H<sub>2</sub> = 3.4' FOR H > 3.4'

(THE BRIDGE EFFECT COEFFICIENT)

3, 4) SPILLWAY (SECTION DE).

Q<sub>S</sub> = Q<sub>DE</sub> = 3.3 x 21.6 H<sup>3/2</sup> = 71.3 H<sup>3/2</sup> (H<sub>1</sub> = H FOR H < 3.4'; H<sub>1</sub> = H + ΔH FOR H<sub>1</sub> ≥ 3.4')

NOTE: LOSS THRU BRIDGE (ΔH) DETERMINED BY ASSUMING Q<sub>DE</sub> = (Q<sub>CF</sub>)' + Q<sub>C<sub>1</sub>F</sub> AND H<sub>1</sub> = H + ΔH FOR ANY SURCHARGE

5) SECTION FG (Q<sub>FG</sub>)<sub>1</sub> = 0.4 x 125 x 3.0 (H<sub>1</sub> - 2.3)<sup>3/2</sup> = 150 (H<sub>1</sub> - 2.3)<sup>3/2</sup>; H ≤ 4.3'

(Q<sub>FG</sub>)<sub>2</sub> = 150 [(H<sub>1</sub> - 2.3)<sup>3/2</sup> - (H<sub>1</sub> - 4.3)<sup>3/2</sup>]; H > 4.3'

\* NOTE: FLOW OVER SLOPED SECTIONS BY APPLICATION OF FORMULA GIVEN BY THE USGS ON "MEASUREMENT OF PEAK DISCHARGE AT DAMS BY INDIRECT METHODS" BY H. HULSHING (APPLICATIONS OF HYDROLOGICS):

$$Q = \frac{2.66}{5} \frac{C^2 b}{(h_2 - h_1)} \left[ h_2^{3/2} - h_1^{3/2} \right]$$
 WHERE: Q = DISCH; C = DISCH COEFF; b = LENGTH; h<sub>2</sub> = h<sub>1</sub> = STATIC HEAD REFERRED TO HIGH & LOW ENDS OF WEIR, RESPECTIVELY.

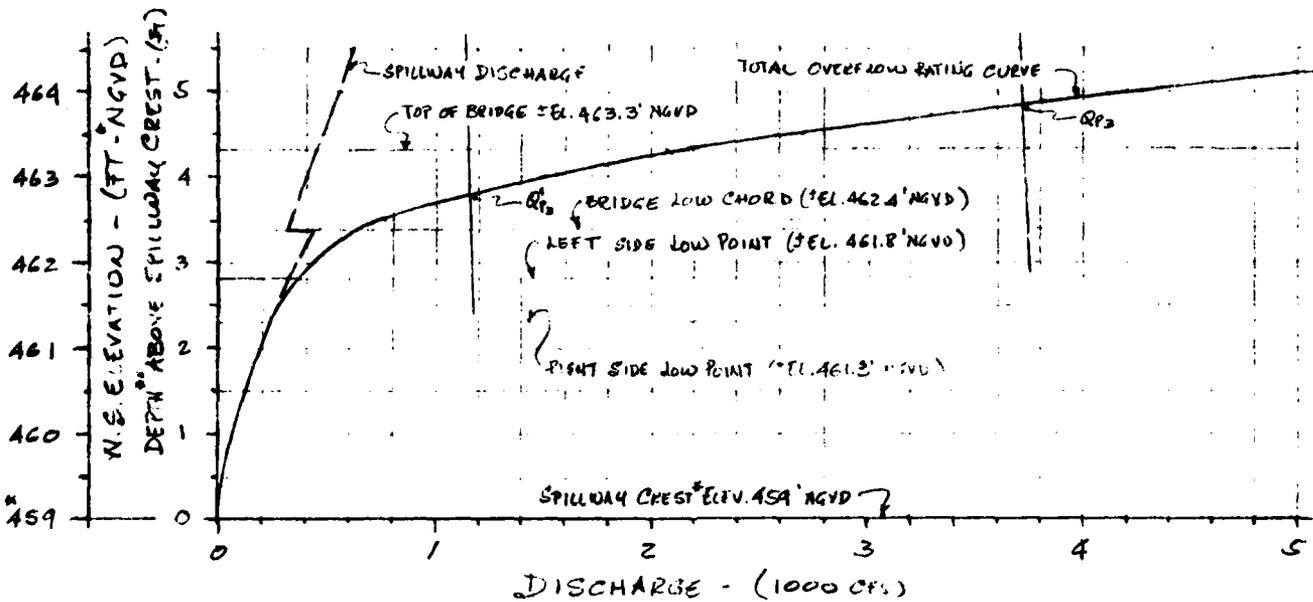
Project NON-FEDERAL DAM: IMPROVEMENT Sheet D-5 of 11  
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6') SECTION 7H:  $(Q_{6H})_1 = 0.4 \times \frac{2}{3} \times 5.5 (H - 3.3)^{3/2} = 73 (H - 3.3)^{3/2}$ ,  $H > 3.3'$   
 $(Q_{6H})_2 = 73 [(H - 2.3)^{3/2} - (H - 3.5)^{3/2}]$  ;  $H > 3.5'$

7') SECTION HJ:  $Q_{7H} = 0.4 \times \frac{2}{3} \times 2.5 (H - 3.5)^{3/2} = 6.67 (H - 3.5)^{3/2}$

THEREFORE, THE TOTAL OUTFLOW IS APPROXIMATED BY THE COMBINATION OF ALL THE APPLICABLE FORMULAE ON ITEMS (1') TO (7')

### (ii) BEVINS POND DAM - OUTFLOW RATING CURVE



\*SEE NOTE P. D-3

\*\*DEPTH (SURCHARGE),  $\frac{1}{2}$  FROM BRIDGE

b) SURCHARGE HEIGHTS TO THIS PEAK INFLOWS ( $Q_p$  &  $Q_p'$ ):

i) @  $Q_p = 1440 \text{ cfs} = 3800 \text{ cfs}$   $H_s = 1.6'$

ii) @  $Q_p' = \frac{1}{2} Q_p = 1200 \text{ cfs}$   $H_s = 3.8'$

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c) EFFECT OF SURCHARGE STORAGE - PEAK OUTFLOWS:

i) AVE LAKE AREA ( $\bar{A}$ ) WITHIN EXPECTED SURCHARGE:

- 1) LAKE AREA AT FLOWLINE (EL. 459' NGVD)\*:  $A_{459} = 12.2^{ac}$
- 2) AREA AT CONTOUR 460' NGVD (MSL)\*:  $A_{460} = 18.0^{ac}$
- 3) AREA AT CONTOUR 470' NGVD (MSL)\*:  $A_{470} = 30.5^{ac}$

$\therefore$  AVE AREA WITHIN EXPECTED SURCHARGE (3.5'):  $\bar{A} \approx \underline{20^{ac}}$   
 (GRAPHICAL INTERPOLATION:  $\approx$  ANGUS - SEE CURVE P. D-7)

\*NOTE: AREAS FROM USGS, MIDDLE HADAM, CT & MOODUS, CT. QUAD. SHEETS. - SCALE 1"=2000'

ii) ASSUME NORMAL POOL AT FLOWLINE ELEV. 459' NGVD ( $H_1 = 0$ )

iii) WATERSHED D.A.  $\approx 4.63^{sq\ mi}$  (SEE P. D-1)

iv) PEAK OUTFLOWS ( $Q_B$  &  $Q'_B$ )

(DETERMINED ON THE OUTFLOW RATING CURVE P. D-5, BY USING THE APPROX. ROUTING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD AND 19" MAX. PROBABLE R.O. IN NEW ENGLAND).

$$Q_B \approx 3700^{cfs} \quad H_2 \approx 4.8' \text{ (ELEV. 463.8' NGVD)}$$

$$Q'_B \approx 1160^{cfs} \text{ SAY, } Q'_B \approx 1200^{cfs} \quad H'_2 \approx 3.8' \text{ (ELEV. 462.8' NGVD)}$$

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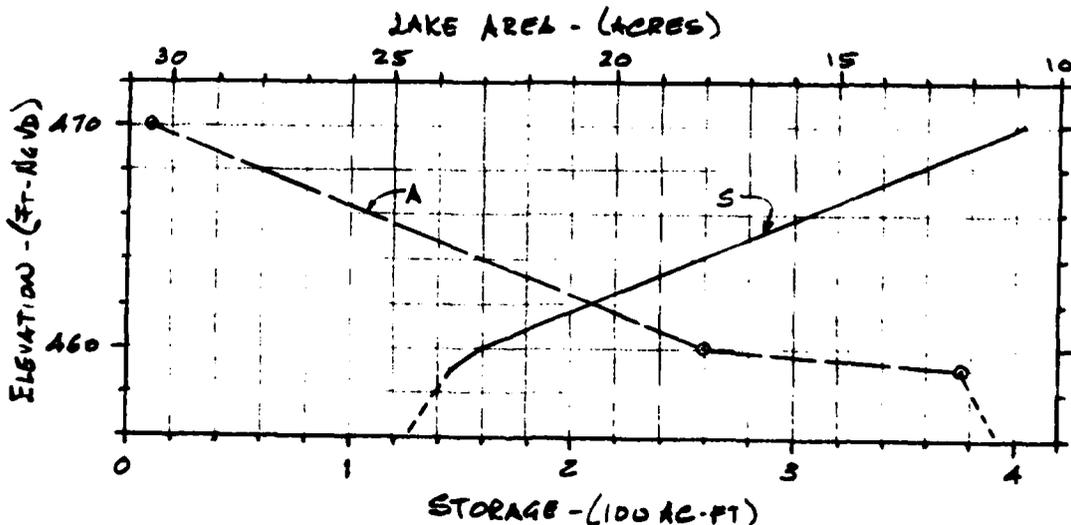
### 3) SPILLWAY CAPACITY RATIO TO PEAK OUTFLOWS:

SPILLWAY CAPACITY TO:	SURCH.* H <sub>1</sub> (FT)	W.S. ELEV. (FT-NGVD)	SPILLWAY CAPACITY (CFS)	SPILLWAY CAPACITY AS % OF PEAK OUTFLOWS	
				Q <sub>12</sub> (3700 CFS)	Q <sub>6</sub> (1200 CFS)
RT. SIDE LOW PT. **	2.3	461.3	250	6.8	21
LT. SIDE LOW PT.	2.8	461.8	330	8.9	28
1/2 PHF	3.8	462.8	380	—	32
PHF	4.8	463.8	530	14	—

\* SURCHARGE ABOVE SPILLWAY CREST (1/4 FROM BRIDGE)

\*\* RIGHT SIDE LOW POINT OVERFLOW (LOWEDED IN 1938 AS AN "EMERGENCY SPILLWAY") NOT INCLUDED AS SPILLWAY CAPACITY.

### 4) LAKE AREA/STORAGE CURVES - BEVINS POND



© AREAS FROM USGS MIDDLE HADDAM/MOODUS, CT QUAD. SHEETS. SEE PP. D-6 (AREAS) AND D-10 (STORAGE). D-7<sup>8</sup>

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## BEVINS POND DAM

### II) DOWNSTREAM FAILURE HAZARD

#### 1) POTENTIAL IMPACT AREA

BEVINS POND DAM IS IMMEDIATELY  $\frac{1}{2}$  OF A MAJOR, HEAVILY BUILT, MOSTLY INDUSTRIAL, SECTION OF EAST HAMPTON, CT., WHICH EXTENDS ALONG THE POCOTOPAUG CREEK FOR (2) 3500'. SEVERAL BUILDINGS SPAN THE CREEK'S CHANNEL, INCLUDING THE BEVINS MFG. CO. FACTORY WHICH RUNS PARALLEL TO THE TDE FOR THE ENTIRE LENGTH OF THE DAM, (3) 50'  $\frac{1}{2}$ . OTHER SMALLER PONDS/DAMS ARE ALSO LOCATED  $\frac{1}{2}$  FROM BEVINS POND.

#### 2) FAILURE AT BEVINS POND DAM.

ASSUME SURCHARGE TO LOW POINT ELEV. 461.3' NGVD.

a) HEIGHT OF DAM\*:  $H = 26.7'$  (TOP EL. <sup>(1)</sup>463.3'; STREAMBED EL. <sup>(2)</sup>436.6')

b) MID-HEIGHT LENGTH\*:  $L = 376'$

c) BREACH WIDTH (SEE NED-ACE  $\frac{1}{2}$  DAM FAILURE GUIDELINES)

$$W = 0.4 \times 376 = 150' \therefore \text{ASSUME } W_b = \underline{150'}$$

d) ASSUMED WATER DEPTH AT TIME OF FAILURE:  $Y_0 = 24.7'$

e) SPILLWAY DISCHARGE AT TIME OF FAILURE:  $Q_s = 250^{2.85}$  (SEE P. D-7)

f) BREACH OUTFLOW (SEE NED-ACE GUIDELINES)

$$Q_b = \frac{8}{27} W_b \sqrt{Y_0}^{3/2} = 31000 \text{ CFS}$$

\*FROM CE FIELD MEASUREMENTS ON 5/29/80 BY JHP & R.J.

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2) PEAK FAILURE OUTFLOW ( $Q_p$ ) TO POCOTOPANG CREEK:

$$Q_p = Q_s + Q_b = 31250 \text{ cfs SAY, } Q_p = \underline{31000 \text{ cfs}}$$

3) FLOOD DEPTH \* IMMEDIATELY  $\frac{1}{2}$  FROM DAM:

$$y = 0.44 y_0 = 10.9' \text{ SAY, } y = \underline{11'}$$

(FROM RETREATING WAVE THEORY APPLIED TO DAM FAILURE)

4)  $\frac{1}{2}$  FAILURE CONDITIONS AT POTENTIAL IMPACT AREA:

THE IMMEDIATE IMPACT AREA IN CASE OF FAILURE OF BEVINS POND DAM IS THE BEVINS MAS. CO. BUILDING, ( $\pm$ ) 50'  $\frac{1}{2}$  (SEE P. D-8). THEREFORE, THE STRUCTURE WILL RECEIVE THE FULL IMPACT OF THE FLOOD PRODUCED UPON FAILURE OF THE DAM. I.E.,  $Q_p = 31000 \text{ cfs}$  AND A STAGE RISING FROM A NEGLIGIBLE DEPTH TO A DEPTH OF ( $\pm$ ) 11' WHICH WOULD INUNDATE THE FACTORY COMPLEX BY MORE THAN 6'.

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### III) SELECTION OF TEST FLOOD

#### 1) CLASSIFICATION OF DAM ACCORDING TO NED ACE GUIDELINES:

a) SIZE: \*STORAGE (AKK)  $\approx 240$  <sup>AC-FT</sup> (50 < S < 1000 <sup>AC-FT</sup>)  
 HEIGHT  $\approx 26.7'$  (25 < H < 40 <sup>FT</sup>)

\*STORAGE: CE ESTIMATED BY  $S = 0.42AH = 0.42 \times 22 \times 26.7 = 247$  <sup>AC-FT</sup> ( $0.42 \times 22 \times 26.7$ ), ALSO,  
 BY ASSUMING AN APPROX. AVE. DEPTH OF 11' AND THE SURFACES STARTING TO TOP OF DAM  
 OF (B) 95 <sup>AC-FT</sup> (SEE P. D-7) AND BY GRAPHICAL INTERPOLATION. U.S. ACE INVENTORY  
 OF DAMS, DATED 1/28/80, P. 38 SIZES:  $S_{max} = 110$  <sup>AC-FT</sup> AND  $M_{max} = 100$  <sup>AC-FT</sup>

HEIGHT: SEE P. D-8

∴ SIZE CLASSIFICATION: SMALL

b) HAZARD POTENTIAL: AS A RESULT OF THE  $P_L$  FAILURE ANALYSIS AND  
 IN VIEW OF THE IMPACT THAT FAILURE OF BEVINS POND DAM MAY HAVE  
 ON THE POTENTIAL IMPACT AREA (P. D-8 & D-9) THE DAM IS CLASSIFIED  
 AS HAVING:

HAZARD CLASSIFICATION: HIGH

2) TEST FLOOD: PMF = 3800 <sup>CFS</sup>

THIS SELECTION IS BASED ON THE RESULT OF THE PREVIOUS ANALYSIS  
 AND CLASSIFICATION

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## BEVINS FOND DAM

### IV) SUMMARY.

1) TEST FLOOD = PMF  $\approx 3800$  cfs

(PARALLEL COMPUTATIONS HAVE BEEN MADE FOR  $\frac{1}{2}$  PMF  $\approx 1200$  cfs AND ARE ALSO SUMMARIZED BELOW)

2) PERFORMANCE AT PEAK FLOOD CONDITIONS:

a) PEAK INFLOWS:  $Q_p = \text{PMF} \approx 3800$  cfs

$Q_p' = \frac{1}{2} \text{PMF} \approx 1200$  cfs

b) PEAK OUTFLOWS:  $Q_B \approx 3700$  cfs

$Q_B' \approx 1200$  cfs

c) SPILLWAY CAPACITY: (SEE TABLE P. D-7)

d) PERFORMANCE:

i) AT TEST FLOOD: OVERTOPPED (±) 2.5' (WS. EL. 463.8' NGVD) ABOVE LOWEST ONSL. FT.

ii) AT  $\frac{1}{2}$  PMF: OVERTOPPED (±) 1.5' (WS. EL. 462.8' NGVD) ABOVE LOWEST ONSL. FT.

3) DOWNSTREAM FAILURE CONDITIONS:

a) PEAK FAILURE OUTFLOW:  $Q_p \approx 3100$  cfs

b) FLOOD DEPTH IMMEDIATELY  $\frac{1}{2}$ S FROM DAM:  $Y_0 \approx 11'$

c) THE ABOVE FLOW AND STAGE REPRESENT APPROXIMATELY THE PREVAILING CONDITIONS UPON FAILURE OF THE DAM AT THE INITIAL IMPACT AREA WHICH IS LOCATED IMMEDIATELY  $\frac{1}{2}$ S.

**PRELIMINARY GUIDANCE  
FOR ESTIMATING  
MAXIMUM PROBABLE DISCHARGES  
IN  
PHASE I DAM SAFETY  
INVESTIGATIONS**

**New England Division  
Corps of Engineers**

**March 1978**

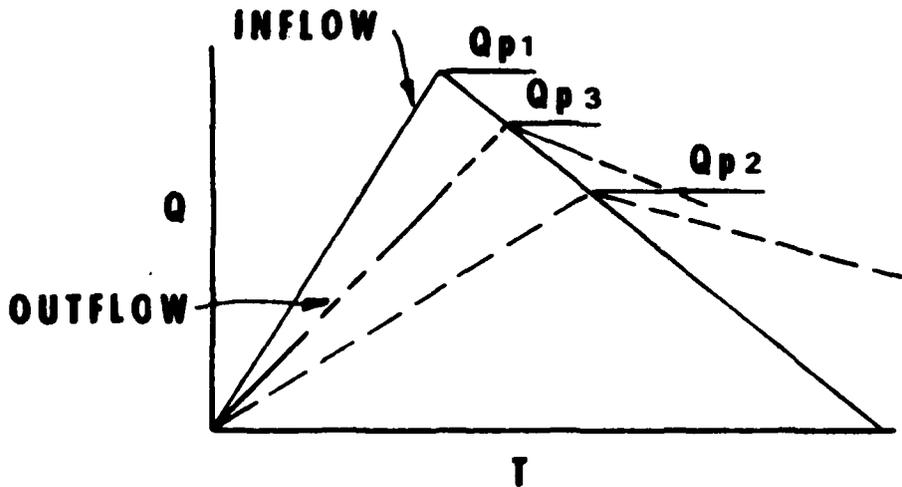
MAXIMUM PROBABLE FLOOD INFLOWS  
NED RESERVOIRS

<u>Project</u>	<u>Q</u> (cfs)	<u>D.A.</u> (sq. mi.)	<u>MPF</u> cfs/sq. mi.
1. Hall Meadow Brook	26,600	17.2	1,546
2. East Branch	15,500	9.25	1,675
3. Thomaston	158,000	97.2	1,625
4. Northfield Brook	9,000	5.7	1,580
5. Black Rock	35,000	20.4	1,715
6. Hancock Brook	20,700	12.0	1,725
7. Hop Brook	26,400	16.4	1,610
8. Tully	47,000	50.0	940
9. Barre Falls	61,000	55.0	1,109
10. Conant Brook	11,900	7.8	1,525
11. Knightville	160,000	162.0	987
12. Littleville	98,000	52.3	1,870
13. Colebrook River	165,000	118.0	1,400
14. Mad River	30,000	18.2	1,650
15. Sucker Brook	6,500	3.43	1,895
16. Union Village	110,000	126.0	873
17. North Hartland	199,000	220.0	904
18. North Springfield	157,000	158.0	994
19. Ball Mountain	190,000	172.0	1,105
20. Townshend	228,000	106.0(278 total)	820
21. Surry Mountain	63,000	100.0	630
22. Otter Brook	45,000	47.0	957
23. Birch Hill	88,500	175.0	505
24. East Brimfield	73,900	67.5	1,095
25. Westville	38,400	99.5(32 net)	1,200
26. West Thompson	85,000	173.5(74 net)	1,150
27. Hodges Village	35,600	31.1	1,145
28. Buffumville	36,500	26.5	1,377
29. Mansfield Hollow	125,000	159.0	786
30. West Hill	26,000	28.0	928
31. Franklin Falls	210,000	1000.0	210
32. Blackwater	66,500	128.0	520
33. Hopkinton	135,000	426.0	316
34. Everett	68,000	64.0	1,062
35. MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS  
BASED ON TWICE THE  
STANDARD PROJECT FLOOD  
(Flat and Coastal Areas)

<u>River</u>	<u>SPF</u> (cfs)	<u>D.A.</u> (sq. mi.)	<u>MPF</u> (cfs/sq. mi.)
1. Pawtuxet River	19,000	200	190
2. Mill River (R.I.)	8,500	34	500
3. Peters River (R.I.)	3,200	13	490
4. Kettle Brook	8,000	30	530
5. Sudbury River.	11,700	86	270
6. Indian Brook (Hopk.)	1,000	5.9	340
7. Charles River.	6,000	184	65
8. Blackstone River.	43,000	416	200
9. Quinebaug River	55,000	331	330

## ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



**STEP 1: Determine Peak Inflow ( $Q_{p1}$ ) from Guide Curves.**

**STEP 2: a. Determine Surcharge Height To Pass " $Q_{p1}$ ".**

**b. Determine Volume of Surcharge ( $STOR_1$ ) In Inches of Runoff.**

**c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore:**

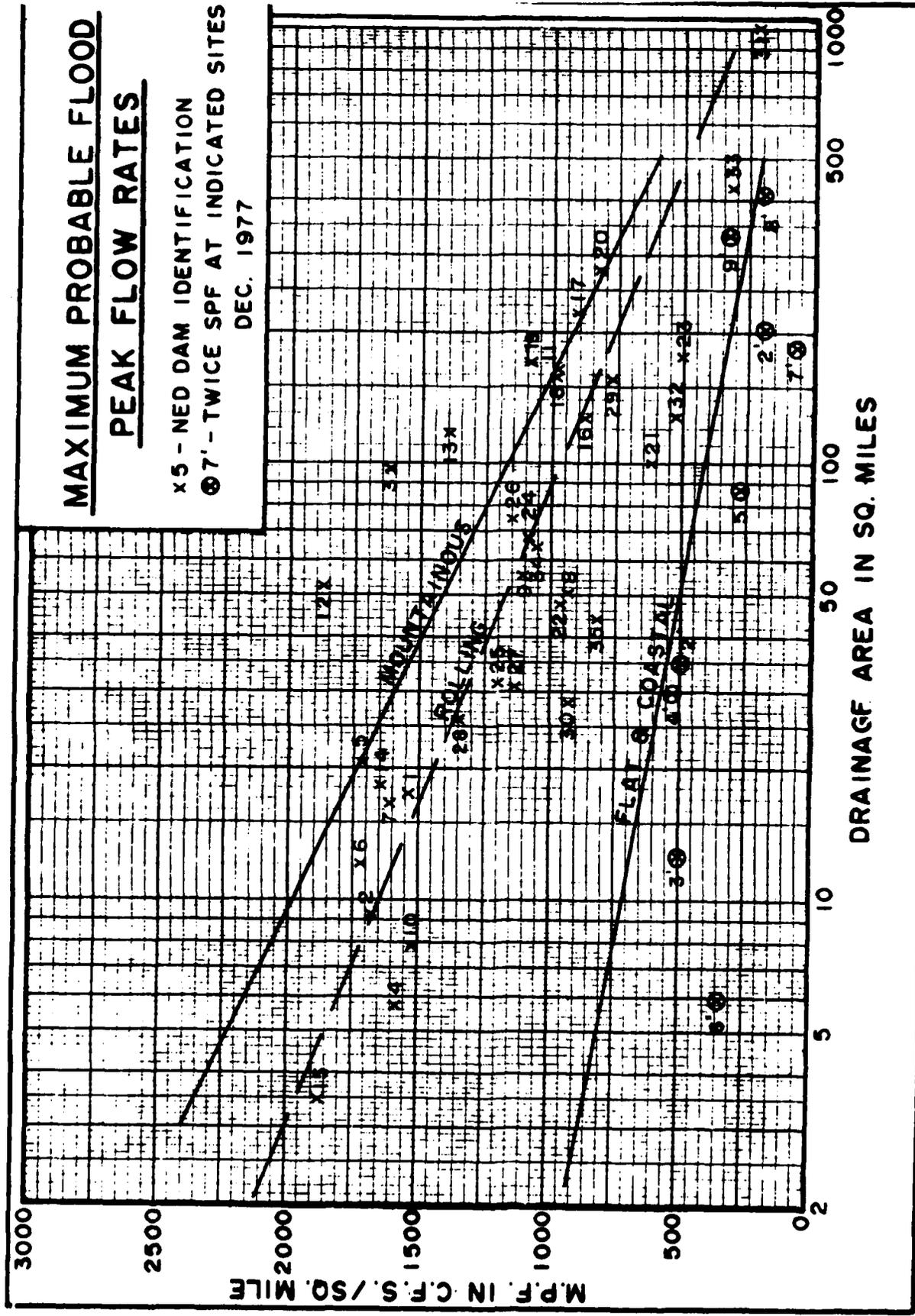
$$Q_{p2} = Q_{p1} \times \left( 1 - \frac{STOR_1}{19} \right)$$

**STEP 3: a. Determine Surcharge Height and " $STOR_2$ " To Pass " $Q_{p2}$ ".**

**b. Average " $STOR_1$ " and " $STOR_2$ " and Determine Average Surcharge and Resulting Peak Outflow " $Q_{p3}$ ".**

**MAXIMUM PROBABLE FLOOD  
PEAK FLOW RATES**

X 5 - NED DAM IDENTIFICATION  
 O 7' - TWICE SPF AT INDICATED SITES  
 DEC. 1977



## **SURCHARGE STORAGE ROUTING SUPPLEMENT**

**STEP 3: a. Determine Surcharge Height and**

**"STOR<sub>2</sub>" To Pass "Q<sub>p2</sub>"**

**b. Avg "STOR<sub>1</sub>" and "STOR<sub>2</sub>" and  
Compute "Q<sub>p3</sub>".**

**c. If Surcharge Height for Q<sub>p3</sub> and  
"STOR<sub>AVG</sub>" agree O.K. If Not:**

**STEP 4: a. Determine Surcharge Height and**

**"STOR<sub>3</sub>" To Pass "Q<sub>p3</sub>"**

**b. Avg. "Old STOR<sub>AVG</sub>" and "STOR<sub>3</sub>"  
and Compute "Q<sub>p4</sub>"**

**c. Surcharge Height for Q<sub>p4</sub> and  
"New STOR<sub>AVG</sub>" should Agree  
closely**

## SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left( 1 - \frac{\text{STOR}}{19} \right)$$

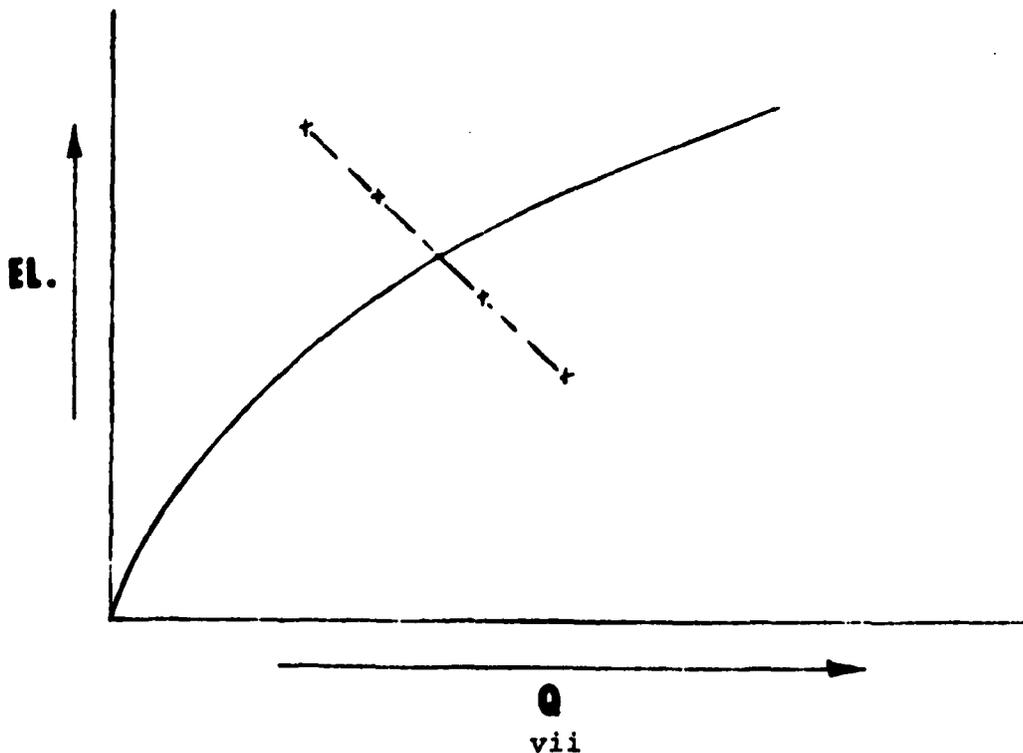
$$Q_{p2} = Q_{p1} - Q_{p1} \left( \frac{\text{STOR}}{19} \right)$$

FOR KNOWN  $Q_{p1}$  AND 19" R.O.

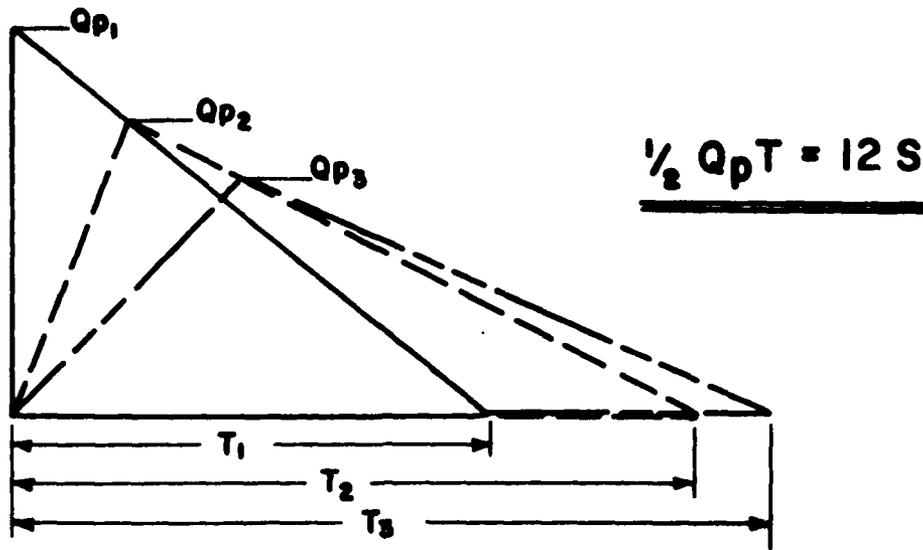
$Q_{p2}$   
=====

STOR  
=====

EL.  
=====



# "RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



**STEP 1:** DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

**STEP 2:** DETERMINE PEAK FAILURE OUTFLOW ( $Q_{p1}$ ).

$$Q_{p1} = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2}$$

$W_b$  = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

$Y_0$  = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

**STEP 3:** USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

**STEP 4:** ESTIMATE REACH OUTFLOW ( $Q_{p2}$ ) USING FOLLOWING ITERATION.

A. APPLY  $Q_{p1}$  TO STAGE RATING, DETERMINE STAGE AND ACCOMPANYING VOLUME ( $V_1$ ) IN REACH IN AC-FT. (NOTE: IF  $V_1$  EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL  $Q_{p2}$ .

$$Q_{p2} (\text{TRIAL}) = Q_{p1} \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE  $V_2$  USING  $Q_{p2}$  (TRIAL).

D. AVERAGE  $V_1$  AND  $V_2$  AND COMPUTE  $Q_{p2}$ .

$$Q_{p2} = Q_{p1} \left(1 - \frac{V_{\text{avg}}}{S}\right)$$

**STEP 5:** FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

**APPENDIX E**  
**INFORMATION AS CONTAINED IN**  
**THE NATIONAL INVENTORY OF DAMS**

# INVENTORY OF DAMS IN THE UNITED STATES

DISTRICT	COUNTY	STATE	FEDERAL PROJECT NO.	STATE PROJECT NO.	LOCAL PROJECT NO.
CT	GR	02			
DAM NAME			DAM TYPE		
BIVENS SAND DAM			DIVERSION		
LATITUDE (NORTH)			LONGITUDE (WEST)		
41 34 0			78 30 21		
ELEVATION (FEET)			COMPLETION DATE		
16 JAN 62					

POPULAR NAME		NAME OF IMPROVEMENT	
BI-GNS POND		BI-GNS POND	
RIVER OR STREAM	NEAREST TOWN OR CITY	NEAREST VILLAGE	POPULATION
POCOTOPAUG CREEK	EAST HAMPTON		3500

TYPE OF DAM	YEAR COMPLETED	PURPOSES	HYDRAULIC CAPACITY		DIST. QWN F20 R	PRV/PED	SCB A	VE-1/DATE
			MAXIMUM DISCHARGE (CFS)	REGULATED FLOW (CFS)				
RECROT	1880	0	23	22	100			NED

REMARKS

20-ESTI 171 21-STONE 22-ESTIMATE 23-INDUS:RIAL

D/S HAS	SPILLWAY TYPE	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CU YD)	POWER CAPACITY INSTALLED (KW)	PROPOSED (KW)	NO. OF DAMS IN PROJECT	NO. OF DAMS IN STATE	NO. OF DAMS IN DISTRICT	NO. OF DAMS IN COUNTY	NO. OF DAMS IN TOWN	NO. OF DAMS IN VILLAGE

OWNER	ENGINEERING BY	CONSTRUCTION BY	
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

INSPECTION BY	INSPECTION DATE	AUTHORITY FOR INSPECTION
	DAY MO YR	

REMARKS

END

FILMED

9-84

DTIC